

HON. JAMAL N. WHITEHEAD

UNITED STATES DISTRICT COURT  
WESTERN DISTRICT OF WASHINGTON  
AT SEATTLE

WASTE ACTION PROJECT,

Plaintiff,

v.

NORTH HARBOR DIESEL AND  
YACHT SERVICE, INC.,

Defendant.

No. 2:24-cv-00172-JNW

JOINT MOTION FOR ENTRY OF  
CONSENT DECREE

Note on Motion Calendar:  
November 15, 2024

MOTION

Plaintiff Waste Action Project and Defendant North Harbor Diesel and Yacht Service, Inc. (collectively, “the Parties”) hereby jointly move the Court for an order approving the entry of the Consent Decree filed herewith.

STATEMENT IN SUPPORT

The Parties have agreed that settlement of this matter is in the public interest and that entry of the Consent Decree is the most appropriate means of resolving this matter. By stipulating to the entry of the proposed Consent Decree, North Harbor Diesel and Yacht Service, Inc. does not admit the facts alleged against it and does not admit liability.

Pursuant to 33 U.S.C. § 1365(c)(3) and 40 C.F.R. §§ 135.4 and 135.5, copies of the Complaint and the Consent Decree will be served on the U.S. Attorney General, the Administrator of the U.S. EPA, and the Regional Administrator of Region 10 of the U.S. EPA.

The Consent Decree may not be entered prior to 45 days following receipt by both the Administrator and the Attorney General. The noting date for the Court's consideration of this matter has been scheduled accordingly.

The parties respectfully request this Court enter the Consent Decree.

RESPECTFULLY SUBMITTED, this 30th day of September, 2024.

SMITH & LOWNEY, PLLC

By: /s/Claire Tonry  
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*Attorney for North Harbor Diesel and Yacht Service, Inc.*

HON. JAMAL N. WHITEHEAD

UNITED STATES DISTRICT COURT  
WESTERN DISTRICT OF WASHINGTON  
AT SEATTLE

WASTE ACTION PROJECT,	)	
	)	No. 2:24-cv-00172-JNW
Plaintiff,	)	
v.	)	CONSENT DECREE
	)	
NORTH HARBOR DIESEL AND	)	
YACHT SERVICE, INC.,	)	
	)	
Defendant.	)	
	)	

**I. STIPULATIONS**

WHEREAS, Plaintiff Waste Action Project filed a complaint on February 8, 2024 against North Harbor Diesel and Yacht Service, Inc. (“North Harbor”) (Dkt. 1) alleging violations of the Clean Water Act, 33 U.S.C. § 1251, *et seq.*, relating to discharges of stormwater and other pollutants from North Harbor’s boatyard at or about 720 30<sup>th</sup> St. A, Anacortes, WA 98221, and any contiguous or adjacent properties owned or operated by North Harbor, and including discharges of wastewater to the Anacortes Wastewater Treatment Plant (the “Facility”), and seeking declaratory and injunctive relief, civil penalties, and attorneys’ fees and costs.

North Harbor denies any fault, wrongdoing, or liability for the claims and violations alleged

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in Plaintiff's Notice Letter and Complaint.

WHEREAS, Waste Action Project and North Harbor (the "Parties") agree that settlement of these matters is in the best interest of the Parties, and that entry of this Consent Decree is the most appropriate means of resolving this action.

WHEREAS, the Parties stipulate to the entry of this Consent Decree without trial, adjudication, or admission of any issues of fact or law regarding Waste Action Project's claims or allegations set forth in its complaint and its sixty-day notice.

DATED this 30 day of September, 2024

NORTH HARBOR DIESEL AND YACHT  
SERVICES INC.

By Howard Bean  
Howard Bean

WASTE ACTION PROJECT

By Greg Wingard  
Greg Wingard  
Executive Director

## II. ORDER AND DECREE

THIS MATTER came before the Court upon the Parties' Joint Motion for Entry of Consent Decree and the foregoing Stipulations of the Parties. Having considered the Stipulations and the promises set forth below, the Court hereby ORDERS, ADJUDGES, and DECREES as follows:

1. This Court has jurisdiction over the Parties and subject matter of this action.
2. Each signatory for the Parties certifies for that party that he or she is authorized to enter into the agreement set forth herein and to legally bind the party or parties, their successors in interest, and assigns of the Parties.
3. This Consent Decree applies to and binds the Parties and their successors and

[PROPOSED] CONSENT DECREE  
No. 2:24-cv-00172-JNW  
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1  
2 assigns.

3 4. This Consent Decree and any injunctive relief includes requirements applicable  
4 to the operation, oversight, or both by North Harbor of the Facility and other requirements  
5 applicable to the non-permitted Storage Yards identified in paragraph 7(c), below.

6 5. This Consent Decree is a full and complete settlement and release of all the  
7 claims in the complaint and the sixty-day notice and all other claims known or unknown  
8 existing as of the date of entry of the Consent Decree that could be asserted under the Clean  
9 Water Act, 33 U.S.C. §§ 1251-1387, against North Harbor. This Consent Decree shall take  
10 effect on the date it is entered as an Order of the Court (the "Effective Date"). As of the  
11 Effective Date, Plaintiff releases Defendant and its members, owners, officials, agents,  
12 representatives, officers, directors, employees, successors and assigns from all claims alleging  
13 discharges in violation of Section 301(a) of the Clean Water Act, 33 U.S.C. § 1311(a),  
14 including those asserted by Waste Action Project in the Notice Letter and Complaint. North  
15 Harbor's payment of attorney's fees and litigation costs set forth in paragraph 9 of the  
16 Consent Decree will be in full and complete satisfaction of any claims Waste Action Project  
17 and Smith & Lowney, PLLC have or may have, either legal or equitable, known or unknown,  
18 and of any kind or nature whatsoever, for fees, expenses, and costs incurred. With respect to  
19 claims released, enforcement of this Consent Decree is Waste Action Project's exclusive  
20 remedy for any violation of its terms.

21 6. This Consent Decree is a settlement of disputed facts and law. It is not an admission  
22 or adjudication regarding any allegations by Waste Action Project in this case or of any fact or  
23

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2 conclusion of law related to those allegations, nor evidence of any wrongdoing or misconduct on  
3 the part of North Harbor or its contractors, customers, or other third parties. North Harbor agrees  
4 to the terms and conditions identified below in paragraphs 7 - 9 in full and complete satisfaction of  
5 all the claims covered by this Consent Decree.

6 7. Upon entry of the Consent Decree, North Harbor will implement the following  
7 injunctive relief:

- 8 a. North Harbor will adhere to the requirements of the Clean Water Act and, at  
9 the facility for which it obtained coverage under the Boatyard General  
10 Permit ("BGP"), the terms and conditions of the BGP and any successor or  
11 modified permits or pretreatment standards.
- 12 b. North Harbor will, on a quarterly basis, electronically forward to Waste  
13 Action Project copies of all submissions and written communications to  
14 and/or from Ecology related to the Facility's compliance with the BGP and  
15 pretreatment standards.
- 16 c. North Harbor will take and maintain measures to ensure that activities  
17 covered by the 2022 BGP do not occur at Yard 1 (located at 3205 V Place,  
18 Anacortes WA 98221), Yard 2 (located at 3311 V Place, Anacortes WA  
19 98221), and Yard 3 (located at 2012 V. Place Anacortes WA 98221)  
20 (collectively "Vessel Storage Yards") including, but not limited to:
- 21 i. Training all North Harbor staff regarding activities prohibited in its  
22 Vessel Storage Yards. Trainings must recur on an annual basis; and  
23

- 1
- 2           ii. Prohibit entry into its Vessel Storage Yards of all fuel supplier trucks;
- 3           and
- 4           iii. Distribute a letter to all Vessel Storage Yard customers listing activities
- 5           prohibited in its storage yards. Letters must be provided to all new Vessel
- 6           Storage Yard customers. The prohibitions in the letter sent in 2024 must
- 7           be resent to all Vessel Storage Yard customers on an annual basis; and
- 8           iv. Maintain the large signs in each of its Vessel Storage Yards that prohibit
- 9           the activities listed in BGP Condition S1.A.(a)-(m); and
- 10          v. Inspect all Vessel Storage Yards on a weekly basis to ensure that no
- 11          activities requiring BGP coverage are occurring; and
- 12          vi. Draft a storage yard plan. The storage yard plan will describe the
- 13          activities prohibited in the storage yards; prescribe the communication
- 14          described in Section 7.c.iii; and weekly inspection of storage yards
- 15          described in Section 7.c.v. A printed copy of the storage yard plan will
- 16          be kept in the same binder as the Stormwater Pollution Prevention Plan
- 17          ("SWPPP") but is not an amendment to or component of the SWPPP.
- 18          d. North Harbor will maintain the concrete plug between the ecology blocks
- 19          located at the northeast corner of its Main Yard where its stormwater
- 20          discharges to ground to ensure that stormwater is contained in that area and
- 21          does not flow offsite prior to discharging to ground.
- 22          e. No later than October 1, 2024, North Harbor agrees to install and have fully
- 23

operational the new treatment best management practices (BMPs) at its Main Yard and its Gas Shop described in its August 2023 Amended Engineering Report (attached as **Exhibit 1** to this Consent Decree).

f. North Harbor will take the following actions to prevent effluent limit violations associated with its pressure wash pretreatment discharges to the City of Anacortes' sanitary sewer system:

i. Use the new multi-step coagulant compound, DELTA DS-100-G Separating Agent from Delta Water Technologies, as part of its pressure wash water pretreatment system; and

ii. If North Harbor's pretreated pressure wash water effluent exceeds any BGP effluent limit, North Harbor will retain a licensed and qualified industrial stormwater professional engineer to: 1) analyze and propose changes to its pressure wash water pretreatment system which are designed to meet the BGP effluent limits, and 2) prepare a written report containing the analysis and recommendations, and the engineer's professional stamp. North Harbor will share that report with Waste Action Project within 45 (forty-five) days of the exceedance.

g. Within thirty (30) days of entry of this Consent Decree, North Harbor will make the following updates and revisions to its SWPPP:

i. Include a detailed description of its pressure wash water pretreatment system including requirements described in section 7(f) of this Consent



Decree, above, and all applicable operation and maintenance standards;  
and

ii. Revise the site map for its Main Yard as follows:

i. Consolidate what is currently presented as two maps (one for sampling basin S001 and the other for sampling basin G001) into a single Main Yard site map which depicts both basins;  
and

ii. Depict flow directional arrows, both sampling locations, and all other requirements of BGP Condition S8.B; and

iii. Depict the location of the new stormwater treatment system and all associated conveyance structures along with the new point of discharge offsite.

iii. Revise the site map for its Gas Shop as follows:

i. Update the depicted location of sampling location M001 to its true location on the other side of gas shop; and

ii. Add the pressure wash pad drainage structures including catch basins and sump; and

iii. Add flow directional arrows to the pressure wash pad to show the area that drains to the pressure wash water pretreatment system; and

iv. Add the location of the pressure wash water pretreatment

system and the system's point of discharge to the City of Anacortes' sanitary sewer system; and

v. Add text clarifying that the roof drains to catch basins that flow to the east and discharge to the bay.

h. Within thirty (30) days of installing the new treatment BMPs described in its August 2023 Amended Engineering Report (**Exhibit 1** to this Consent Decree) and referenced in section 7(e) of this Consent Decree, North Harbor will add the new treatment BMPs to its SWPPP.

i. North Harbor will confirm submission of a corrected April 2024 discharge monitoring report ("DMR") to Ecology.

8. Payment for Environmentally Beneficial Project: Within thirty (30) days of entry of this Consent Decree, North Harbor will pay \$70,000 (SEVENTY THOUSAND DOLLARS) to the Rose Foundation for the sole use for projects that benefit water quality in the north Puget Sound and Padilla Bay watersheds, as described in **Exhibit 2** to this Consent Decree. The check will be made to the order of the Rose Foundation for Communities and the Environment, and delivered to 201 4<sup>th</sup> Street, Suite 102, Oakland, CA 94707. Payment will include the following reference in a cover letter or on the check: "Consent Decree, Waste Action Project v. North Harbor Diesel & Yacht Service Inc. W.D. Wash. No. 2:24-cv-00172-JNW." North Harbor will send a copy of the check and cover letter, if any, to Waste Action Project and its counsel, pursuant to the notice provisions in paragraph 18.

9. Within ten (10) days of entry of this Consent Decree by the Court, North Harbor

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1  
2 will pay \$50,000 (FIFTY THOUSAND DOLLARS) to Waste Action Project to cover Waste  
3 Action Project's litigation fees, expenses, and costs (including reasonable attorneys and expert  
4 witness fees) by check payable and mailed to Smith & Lowney, PLLC, 2317 East John St.,  
5 Seattle, WA 98112, attn: Claire Tonry.

6 10. A force majeure event is any event outside the reasonable control of North  
7 Harbor that causes a delay in performing tasks required by this Consent Decree that cannot be  
8 cured by due diligence. Delay in performance of a task required by this Consent Decree caused  
9 by a force majeure event is not a failure to comply with the terms of this Consent Decree,  
10 provided that North Harbor timely notifies Waste Action Project of the event, the steps that  
11 North Harbor will take to perform the task, the projected time that will be needed to complete  
12 the task, and the measures that have been taken or will be taken to prevent or minimize any  
13 impacts to stormwater quality resulting from delay in completing the task.

14 11. North Harbor will notify Waste Action Project of the occurrence of a force majeure  
15 event as soon as reasonably possible but, in any case, no later than fifteen (15) days after North  
16 Harbor becomes aware of the event. In such event, the time for performance of the task will be  
17 extended for a reasonable period of time following the force majeure event.

18 By way of example and not limitation, force majeure events include

- 19 a. Acts of God, war, insurrection, or civil disturbance;
- 20 b. Earthquakes, landslides, fire, floods;
- 21 c. Actions or inactions of third parties over which North Harbor has no or  
22 limited control;

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e. Restraint by court order or order of public authority; and

f. Strikes.

12. This Court retains jurisdiction to oversee and ensure compliance with this Consent Decree. While this Consent Decree remains in force, this case may be reopened without filing fees so that the Parties may apply to the Court for any further order or relief that may be necessary regarding compliance with this Consent Decree or to resolve any dispute regarding the terms or conditions of this Consent Decree. In the event of a dispute regarding implementation of, or compliance with, this Consent Decree, the Parties must first attempt to resolve the dispute themselves, as follows: the Party identifying or wishing to raise an issue or dispute must provide the other Party's counsel of record with written notice detailing the nature of the issue or dispute, the underlying facts, and the legal grounds for the alleged issue or dispute. The parties shall meet to discuss the dispute and any suggested measures for resolving the dispute and seek to develop a mutually agreed upon plan, including implementation dates, to resolve the dispute or alleged breach. Such a meeting will be held as soon as practical but must be held within thirty (30) days after notice of a request for such a meeting to the other Party and its counsel of record. If no resolution is reached at that meeting or within thirty (30) days of the Notice, either Party may file a motion with this Court to resolve the dispute. The provisions of section 505(d) of the Clean Water Act, 33 U.S.C. § 1365(d), regarding awards of costs of litigation (including reasonable attorney and expert witness fees) to any prevailing or substantially prevailing party, will apply to any additional court proceedings necessary to enforce the terms and conditions of this Consent Decree.

13. The Parties recognize that, pursuant to 33 U.S.C. § 1365(c)(3), no consent judgment

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2 can be entered in a Clean Water Act suit in which the United States is not a party prior to forty-five  
3 (45) days following the receipt of a copy of the proposed consent judgment by the U.S. Attorney  
4 General and the Administrator of the U.S. Environmental Protection Agency (“EPA”). Therefore,  
5 upon the filing of this Consent Decree by the parties, Waste Action Project will serve copies of it  
6 upon the Administrator of the U.S. EPA and the U.S. Attorney General.

7 14. The Consent Decree terminates three (3) years after that date.

8 15. Both Parties have participated in drafting this Consent Decree.

9 16. This Consent Decree constitutes the entire agreement between the Parties. There are  
10 no other or further agreements, either written or verbal. This Consent Decree may be modified only  
11 upon a writing signed by both Parties and the approval of the Court.

12 17. If for any reason the Court should decline to approve this Consent Decree in the  
13 form presented, this Consent Decree is voidable at the discretion of either Party. The Parties agree  
14 to continue negotiations in good faith to cure any objection raised by the Court to entry of this  
15 Consent Decree.

16 18. Notifications required by this Consent Decree must be in writing and via email. For  
17 a notice or other communication regarding this Consent Decree to be valid, it must be sent to the  
18 receiving Party at the one or more email addresses listed below or to any other address designated  
19 by the receiving Party in a notice in accordance with this paragraph.

20 **If to Waste Action Project:**

21 Greg Wingard  
22 Waste Action Project  
23 gregwap@earthlink.net

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**And to:**

Claire Tonry  
Katelyn Kinn  
Smith & Lowney PLLC  
claire@smithandlowney.com  
katelyn@smithandlowney.com

**If to North Harbor:**

Howard Bean  
howard@northharbordiesel.com

**And to:**

Mr. Bradford Doll  
brad.doll@foster.com

Any party identified in the notice provisions above may affect a change in the notice address by providing a notice complying with these provisions to all other parties listed. A notice or other communication regarding this Consent Decree will be effective the day it is transmitted. An email is effective the day it is sent so long as it is sent by 5 pm and on a business day, or else it is effective the following business day.

DATED this 16th day of December, 2024.

  
HON. JAMAL N. WHITEHEAD  
UNITED STATES DISTRICT JUDGE

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Presented by:

SMITH & LOWNEY, PLLC

By: /s/ Claire Tonry

Claire Tonry, WSBA #44497

Katelyn Kinn, WSBA #42686

*Attorneys for Plaintiff Waste Action Project*

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# Exhibit 1





# STORMWATER TREATMENT ENGINEERING REPORT - *REVISED DRAFT*

North Harbor Diesel & Yacht Service Facility  
Anacortes, Washington

August 2023

Prepared for  
North Harbor Diesel & Yacht Service Inc.  
720 30th Street  
Anacortes, Washington

**Stormwater Treatment Engineering Report  
North Harbor Diesel and Yacht Service Facility  
720 30<sup>th</sup> Street  
Anacortes, Washington**

This document was prepared by, or under the direct supervision of, the technical professionals noted below.

  
Joseph Kalmar, PE Principal



Date: May 31, 2023  
Project No.: 001.010  
File path: P:\2177\R\Engineering Report\Signature Page.docx

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**FIGURES**

<b>Figure</b>	<b>Title</b>
1	Vicinity Map
2	Stormwater Site Map – Existing Conditions S001 Area
3	Stormwater Site Map – Existing Conditions M001 Area
4	Stormwater Site Map – Proposed S001 Area Treatment Improvements
5	Stormwater Site Map – Proposed M001 Area Treatment Improvements

**TABLES**

<b>Table</b>	<b>Title</b>
1	Facility Stormwater Monitoring Results
2	Pollutant Reduction Needed by Stormwater Treatment
3	Evaluation and Screening of Stormwater Treatment Alternatives

Stormwater Treatment Engineering Report  
North Harbor Diesel & Yacht Service

## APPENDICES

Appendix	Title
A	Hydrologic Modeling Output
B	Stormwater Treatment Performance Graphs – Port of Port Townsend Boatyard
C	Chitosan Sock Installation Schematic
D	Schematic Diagram – Oyster Shell Filter Vault

Stormwater Treatment Engineering Report  
North Harbor Diesel & Yacht Service

## LIST OF ABBREVIATIONS AND ACRONYMS

µg/L.....	micrograms per liter
AO .....	Administrative Order
BMP.....	best management practice
Ecology.....	Washington State Department of Ecology
Facility.....	North Harbor Diesel & Yacht Service, Inc. facility
mg/L.....	milligrams per liter
NTU .....	nephelometric turbidity unit
Permit .....	Boatyard General Permit No. WAG0030123
SWPPP.....	Stormwater Pollution Prevention Plan
WWHM .....	Western Washington Hydrologic Model

Stormwater Treatment Engineering Report  
North Harbor Diesel & Yacht Service

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## 1.0 INTRODUCTION

This engineering report has been prepared for North Harbor Diesel & Yacht Service Inc. (North Harbor) to present the stormwater treatment design for its Westport facility (Facility) located at 720 30th St in Anacortes, Washington. A map of the vicinity, showing the location of the Facility is provided on Figure 1. The Facility is covered under the Boatyard General Permit No. WAG030123 (Permit) issued by the Washington State Department of Ecology (Ecology). North Harbor previously missed some monthly stormwater monitoring events, and sampling results from samples that were collected triggered a Level 3 Response for copper and zinc at two stormwater discharge locations. Ecology issued an Administrative Order, Docket #21656 (AO) on March 15, 2023, which requires North Harbor to complete a stormwater treatment engineering report by May 31, 2023.

### 1.1 Facility Description

North Harbor's operations involve a range of boatyard activities, including vessel repair and vessel maintenance. The Facility conducts operations on separate properties, with the majority of boatyard work conducted at the main facility. Engine testing, boat hull cleaning on a wash pad, and other support activities are conducted at a smaller property near the launch ramp, located at 301A 30th Street, east of North Harbor's main operations. The activities onsite are seasonal and change throughout the fishing seasons, going from less active in the winter to highly active in the spring, summer, and early fall. The Facility generally has impervious surfaces consisting of asphalt or concrete pavement, compacted gravel, and buildings and storage structures.

### 1.2 Stormwater Drainage and Discharge

North Harbor has 3 established stormwater discharge monitoring locations. The northeast portion of the main yard has a gravel surface where stormwater is able to infiltrate and associated monitoring point G001, where stormwater results are compared against copper and zinc Permit discharge limits (not benchmarks) for infiltration to ground. Discharge monitoring results at G001 have not exceeded Permit limits; therefore, the G001 drainage basin area is not discussed further in this report.

The majority of the main yard contains paved surfaces and drains to a storm drainage system that discharges to the City storm sewer system near the southeast corner of the property. The final catch basin before discharge from the Facility is labeled as monitoring point S001, which is also referred to as the Main Gate stormwater discharge point. The identified boundary of this Main Gate drainage area is an area of approximately 1.14 acres, and this drainage basin and discharge monitoring point location are shown on Figure 2.

The launch ramp area of the facility is located at the separate smaller property to the east. The launch ramp location property contains the paved launch ramp roadway, where no boat maintenance or repair work is conducted, and which North Harbor shares access with to other businesses and the public. There is a concrete boat wash pad at the south side of this property, which is also shared with other businesses, and where all of the wash water is collected and treated by North Harbor and is either reused for washing or discharged to the City sanitary sewer in accordance with conditions established in

Stormwater Treatment Engineering Report  
North Harbor Diesel & Yacht Service

the Permit. North Harbor conducts the bulk of its engine testing and other boatyard related activities inside the west portion of the building at the north side of the property, with a small asphalt paved area west of the building that is approximately 0.09 acres in size and contains one catch basin. Engine testing and material storage occur in that small, uncovered area. The building has a coated roof that is not an identified source of zinc or copper, and North Harbor restricts its exposed boatyard industrial operations to the small area west of the building (other than the boat washing previously mentioned, where drainage is contained and discharged to sanitary sewer). Stormwater discharge monitoring from this property has in the past been conducted at monitoring point M001, which is a catch basin located downstream from the North Harbor storm drainage. The M001 drainage area and discharge monitoring point are shown on Figure 3.



## 2.0 STORMWATER TREATMENT EVALUATION

This section presents a summary of Facility stormwater quality, hydrologic modeling and design flow rate analysis, and evaluation and selection of applicable stormwater treatment alternatives.

### 2.1 Stormwater Characterization

Under the Facility's Permit, stormwater discharge monitoring has been conducted during Permit-designated months at the established discharge monitoring points.

A summary of past stormwater discharge sampling results for prior years, at discharge monitoring points S001 and M001, is provided in Table 1.

Average and maximum concentrations of copper, and zinc over this prior period were used to identify the treatment system performance requirements to meet Permit benchmarks. This estimated necessary level of treatment is presented in Table 2 as the percent reduction necessary to be below benchmark values. For the S001 main facility drainage basin, the reductions needed for average concentrations of copper and zinc were calculated to be 86 percent and 79 percent, respectively. For the maximum concentrations measured, more significant removal would be necessary to meet benchmarks, with the percent reductions required for maximum values of copper and zinc being 96 and 90 percent, respectively.

For the M001 main facility drainage basin, the reductions needed for average concentrations of copper and zinc were calculated to be 58 percent and 66 percent, respectively. For the maximum concentrations measured, more significant removal would be necessary to meet benchmarks, with the percent reductions required for maximum values of copper and zinc being 59 percent and 75 percent, respectively.

### 2.2 Hydrologic Modeling

Because the evaluation and selection of stormwater treatment alternatives involves water quantity, not just water quality, and the treatment system needs to have a flow rate sizing basis. Hydrologic modeling was performed for the Facility to determine the necessary design conveyance and treatment flow rates for the two drainage basins of interest. Modeling was conducted using the hydrologic modeling software approved by Ecology, which is the Western Washington Hydrologic Model (WWHM), the most current update of Version 2012.

The WWHM output, which includes a summary of drainage areas and modeling assumptions, is included in Appendix A for reference. As indicated in Appendix A, the design treatment flow rates in gallons per minute (gpm) were determined to be:

- S001
  - Online water quality flow rate = 67.7 gpm
  - Offline water quality flow rate = 38.4 gpm

- M001
  - Online water quality flow rate = 5.3 gpm
  - Offline water quality flow rate = 3.0 gpm

## 2.3 Evaluation and Screening of Alternatives

A summary of the evaluation and screening of a range of the most applicable stormwater treatment methods on the basis of effectiveness, implementability, and cost is presented in Table 3.

## 2.4 Stormwater Treatment

Based on the estimated level of treatment necessary for pollutant removal, summarized in Table 2, and the screening of treatment options in Table 3, a media filtration system with coagulation pretreatment is the preferable choice for the S001 drainage area at the main facility. This selection is based on effectiveness (including ability to meet benchmarks), implementability, and cost. The S001 drainage area is near a gravel surfaced area with boat lift traffic and other tracking of fine particulate solids into the area. Therefore, it is estimated that coagulation pretreatment would be necessary for a media filter to be effective in meeting the benchmarks for copper and zinc, by coagulating the small particles together and allowing physical filtration removal by the media. The metals-adsorptive capacity of the media can remove the fully dissolved ionic form of copper and zinc as well.

Also based on the estimated level of treatment necessary for pollutant removal (Table 2) and the screening of treatment options in Table 3, a media filtration system (without need for coagulation pretreatment) is the preferable choice for the M001 drainage area. The small M001 drainage area is in a fully paved area without an identified significant source of fine particulates or for tracking in fine particulate solids from adjacent areas. A filter with general particulate capture and a metals-adsorptive media deemed to be appropriate treatment option based on effectiveness (including ability to meet benchmarks), implementability, and cost. Those two treatment options are discussed further in the subsections below.

### 2.4.1 S001: Media Filtration with Coagulation Pretreatment

In considering the use of a coagulant to improve stormwater filtration at S001, it is helpful to examine a case study at another boatyard covered under the Boatyard General Permit. At the Port of Port Townsend boatyard, there are two large StormwaterRx Aquip filters that have been used for a number of years for treatment of stormwater runoff from two of the four main drainage basins at the 20-acre boatyard. However, removal of metals was often found to be less than 60 percent by Aquip filters there, and the effluent results had fairly consistently been well above the copper and zinc benchmark values in the Boatyard General Permit. Media filters can do well at removing metals and other pollutants associated with larger particulate suspended solids (e.g., greater than 20- or 30-micron nominal particle diameter). Media filters with an activated media component (beyond just inert sand filters) can also effectively adsorb fully dissolved metals that are in their ionic form. However, media filters are not as effective at removing pollutants when they are bound to small, suspended solids (e.g., less than 20-micron nominal diameter particles).

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North Harbor Diesel & Yacht Service

The Port of Port Townsend boatyard stormwater had a particularly high concentration of small-diameter particulates suspended in the stormwater due to the boat travel lifts that are used at the facility along with the mostly gravel surface yard. As the gravel gets broken down under the high pressure of the travel lift wheels, significant amounts of small particulates are created.

Landau worked with the Port of Port Townsend to install a passive dose coagulant upstream of the Aquip filter units at the site (and also at other bioswales) to filter out the small particulates more effectively in the media filter. Coagulants act to bind to particles and to allow them to bind together into larger particle mass that can be settled out or filtered out of the water. Chitosan is a particular polymer coagulant derived from crab or shrimp shells that carries positive charges along its molecular chain that can attract small suspended solids, which often tend to carry a slight negative charge and otherwise repel other small particulates. Specifically at the Port of Port Townsend boatyard, LAI installed chitosan lactate solid gel packs, where the risk of overdosing a liquid coagulant is minimized and where the passive dosing is relatively simple and significantly reduces the project cost relative to an advanced and automated chitosan-enhanced sand filtration system. Stormwater treatment performance graphs for the use of media filtration with chitosan lactate pretreatment are shown in Appendix B.

While there are not extensive high-wear gravel surfaces within the S001 drainage basin of the Facility, there are plenty of sources for fine particulates from vehicle and travel lift wear of gravel and dirt particles in adjacent areas of the Facility that can be tracked into the paved portions of the Facility and that cannot be fully captured by source control BMPs (e.g., vacuum sweeping). Therefore, fine suspended solids are suspected to be present in Facility stormwater runoff. A chitosan coagulation pretreatment step would help media filtration to capture those small-diameter particles rather than allow them to pass through the filter media.

A schematic diagram of a chitosan lactate pretreatment contactor and detention/mixing pipe, as part of a media filter system, is included in Appendix C. Part of the treatment design for North Harbor would also be to install a new pump station vault (minimum 120 gallon capacity) at the location of the S001 monitoring point catch basin. A submersible pump will also be provided, which will have capacity for the design flow rate of 38.4 gpm, at a total dynamic head of 25 ft, for flow through the chitosan lactate contactor and up into the aboveground media filter. A flow meter is recommended for tracking total flow volume through the chitosan lactate contactor and helping to determine when the chitosan gel pack should be replaced.

As indicated in Table 3, there are multiple types of media that can be used and that have good metals-adsorptive capacity. For North Harbor a combination of an adsorptive media that is effective for both dissolved metals and organics (e.g., granular activated carbon or biochar) is recommended as a top adsorptive layer in combination with activated alumina as a second, bottom layer of media. Activated alumina is highly effective at removing dissolved copper and dissolved zinc. On top of the carbon and alumina layers there should be a layer of filter sand for trapping the coagulated solids. The media filtration bed should be sized to provide surface area such that a filtration rate of 1 gpm per square foot (SF) is not exceeded, with a recommendation to size closer to 0.5 gpm/SF. For the design treatment flow rate of 38.4 gpm, the media filtration surface area should be 77 SF or larger. Similar to Ecology design in

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North Harbor Diesel & Yacht Service

the 2019 Stormwater Management Manual for Western Washington for a bioretention soil media filter swale, the depth of the full filter media layer should be at least 18 inches.

The area identified for the stormwater media filter equipment is shown on Figure 3. That area identified would be more than adequate to fit the identified components of chitosan lactate contactor, detention/settling pipe, and aboveground media filter box.

#### **2.4.1.1 Chitosan Lactate Pretreatment**

As previously described in this report, the use of chitosan lactate as a pretreatment coagulation step would involve placing a chitosan lactate gel pack contactor upstream of the filter media box. The pretreatment step would also involve providing enough hydraulic mixing/holding time for the dissolved chitosan by also providing an added large-diameter pipe downstream of the contactor. That added pipe will be designed to provide a minimum of 30 seconds of mixing/holding time, which would allow the chitosan coagulation step to be completed before the stormwater is drained into the media filter. An example of this type of chitosan lactate pretreatment step is provided on a schematic diagram included in Appendix C.

Chitosan lactate gel packs would be acquired from Dungeness Environmental Solutions, Inc. or an alternative supplier approved by the engineer. For the 38.4-gpm design treatment flow rate, the minimum 30 seconds of mixing/holding time could be provided by 8-foot length of 8-inch-diameter pipe or by 14-foot wrapped length of 6-inch-diameter pipe. The steel filter box structure that will be used for the media filter will provide a sturdy surface from which to mount the contactor pipe and detention volume pipe.

Regarding the environmental safety of this approach, even in the unlikely event that chitosan-treated water was to bypass the filter, the dissolved chitosan would not be free to affect aquatic organisms (such as adhering to fish gills) because it would encounter other suspended particles within the stormwater conveyance piping, and bind to those particles, before discharging from the stormwater outfall. Once the chitosan is bound to a suspended particle, it would be unavailable to bind to aquatic species. When Landau has conducted residual chitosan testing for other stormwater treatment pilot tests using a colorimetric test kit, test results have been negative (less than 1 part per million residual chitosan).

#### **2.4.1.2 Chemical Usage**

The chitosan lactate solid gel packs for pretreatment will be used in a safe and controlled manner, in accordance with an Operation and Maintenance Manual (O&M Manual) that will be prepared prior to startup of the treatment process. The O&M Manual will include detailed procedures for periodic testing for residual chitosan at the treated stormwater effluent to demonstrate that the passive chitosan dosing is not resulting in excess chitosan being dissolved and passing through or bypassing the filter media.

### **2.4.2 M001: Media Filtration without Coagulation Pretreatment**

For the relatively low treatment flow rate of 5.3 gpm for the small M001 drainage basin, and the lack of a source of fine suspended solids in the area that might require coagulation pretreatment, media

filtration without the use of chitosan pretreatment is identified as the preferred stormwater treatment approach.

As indicated in Table 3, there are multiple types of media that can be used and that have good metals-adsorptive capacity. At this location, with the relatively low design treatment flow rate, it would be preferable to install a media filter system that would not require installation of a pump station vault, submersible pump, and new electrical service to that location, and associated trenching through the paved area for new force main piping and electrical conduit. Therefore, one approach would be to install a belowground media filter vault and oyster shell flake as a known media with good copper and zinc uptake capacity and good hydraulic conductivity.

An example schematic of an oyster shell filter vault constructed at another boatyard from an oil/water separator vault is shown on an example figure that is provided in Appendix D. Performance of that boatyard oyster shell media filter vault for copper and zinc removal is shown in Table D-1 of Appendix D.

Oyster shell treatment vault sizing calculations for North Harbor are provided in Table D-2 of Appendix D. The oyster shell vault will be conservatively oversized to provide an oyster shell volume of 20 cubic feet, for an equivalent empty bed contact time that will exceed 25 minutes. As a slight difference with the schematic shown in Appendix D, the filter vault for North Harbor can have all of the oyster shell in the primary vault chamber, and the oyster shell flake will be installed in bulk rather than in mesh bags. There will be a 2-inch well screen-slotted underdrain pipe installed, with a 1-inch diameter outlet pipe restrictor used to moderate and slow the flow rate through the oyster shell.

Treatment would include installation of a new structural catch basin filter insert filter in the existing catch basin, such as the CleanWay stainless steel structural basket filter housing that can accept replaceable Adsorbit® type filter fabric with 100-micron nominal opening. That Adsorbit® type filter fabric also has the ability to absorb small amounts of oil or oil sheen. Treatment would also include installation of a new filter vault downstream of that catch basin that would be filled with oyster shell flake (nominal 3/8-inch size pieces) to provide effective adsorption of copper and zinc as well as solids capture capability. As indicated in Table D-3 of Appendix D, the vault minimum dimensions would provide for a minimum height of 2 ft of oyster shell and length and width to accommodate the overall minimum volume of 20 cubic feet of filter media. The approximate layout and location of the stormwater treatment equipment is shown on Figure 5.

## 2.5 Statement of Sound Engineering Justification

Based on Landau's viewing of the North Harbor facility, analysis of the past copper and zinc stormwater sampling results, evaluation of applicable technologies, and demonstration of the treatment process at another industrial locations, the treatment approach planned for NHD's Anacortes Facility is reasonably expected to meet the Permit benchmarks.

There are no facility stormwater sampling results during large storm events that exceed the water quality design treatment flow rates described in this report, but these treatment designs are expected

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to meet benchmarks with the combination of treated stormwater and high flow bypass, given expected treatment effectiveness and expected dilution effects that occur during extreme rainfall events.

## **2.6 Installation Schedule**

North Harbor plans to have the identified stormwater treatment systems installed and operational as soon as practicable and within 6 months from Ecology approval of this engineering report and stormwater treatment design.

### 3.0 OPERATION AND MAINTENANCE

North Harbor will own, operate, and maintain the two stormwater treatment systems. The recommended operation and maintenance of the systems is for weekly monitoring (during a period of precipitation, if possible) to check for proper function. Formal monitoring observations and records of the operation and maintenance of the stormwater treatment units will be recorded on an updated version of the weekly Stormwater Pollution Prevention Plan (SWPPP) inspection form.

An O&M Manual will be prepared for the two stormwater treatment systems. The O&M manual will include procedures for proper system startup, an operator's log, and procedures for conducting residual chitosan testing. The O&M Manual to be completed before treatment system startup will provide information on system maintenance and filter media replacement. The O&M Manual is to be kept updated as a component of an updated SWPPP for the Facility.

#### 3.1 Disposal of Used Filter Media

The metals-adsorptive filter media periodically needs to be replaced and the spent media disposed of. Spent media should be managed and disposed of per applicable laws and regulations. It is recommended that a sample be analyzed for a standard suite of total metals for waste characterization. Such metals characterization sampling might include 8 Resource Conservation and Recovery Act metals (RCRA 8 metals) arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver, plus the additional analysis of total copper and total zinc. It can then be determined whether the material to be disposed of exceeds toxicity characteristics for either hazardous waste or state dangerous waste; those analytical results would provide documentation for appropriate handling and disposal. Depending on the results of the analyses for total metals, toxic characteristic leaching procedure testing for metals may be necessary to confirm that the waste is not a hazardous waste due to metals toxicity, or a bioassay test may be necessary to confirm that the waste is not a state dangerous waste. It is also advised to check with the waste hauler, as there may be requirements to test for petroleum hydrocarbons or other pollutant parameters, depending on the requirements of the specific waste treatment or disposal facility.

After the first characterization of spent filter media, if there are no process changes (i.e., a modification of the Facility that would increase pollutants or add new pollutants to stormwater), then the spent solids characterization should not change significantly over time, and the frequency of subsequent characterization may be dependent on procedures of the waste hauler.

#### 3.2 Estimated Operation and Maintenance Cost

As indicated above, because there are no known significant sources of lead or other pollutants at the Facility that would cause the spent stormwater filtration media to be characterized as a hazardous or state dangerous waste, it is expected that the waste characterization results for the spent filtration media will show that the media can be disposed of as solid waste to a municipal solid waste landfill. Therefore, the overall annual cost for maintaining the media filtration system described in this report, including media disposal and replacement with fresh filter media for the Facility (given that not all filter

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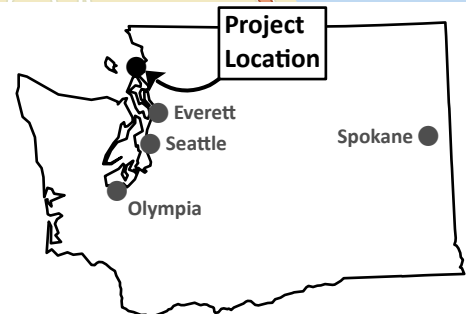
media should need to be replaced each year) is expected to be less than \$25,000 per year on average. The actual frequency of media replacement will be somewhat dependent on the level of effort in good housekeeping and other source control BMPs practiced.



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## 4.0 USE OF THIS REPORT

This report has been prepared for the exclusive use of North Harbor Diesel & Yacht Service, Inc. and applicable regulatory agencies for specific application to the stormwater treatment system at the North Harbor Diesel & Yacht Service, Inc. Facility located at 720 30<sup>th</sup> Street in Anacortes, Washington. No other party is entitled to rely on the information, conclusions, and recommendations included in this document without the express written consent of Landau. Further, the reuse of information, conclusions, and recommendations provided herein for extensions of the project or for any other project, without review and authorization by Landau, shall be at the user's sole risk. Landau warrants that within the limitations of scope, schedule, and budget, our services have been provided in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions as this project. Landau makes no other warranty, either express or implied.



North Harbor Diesel &  
Yacht Service, Inc.  
Anacortes, Washington

Figure  
1

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NHD000444



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**Legend**

- FACILITY BOUNDARY
- → STORMWATER AND STORMDRAIN FLOW DIRECTION
- STORMDRAIN
- CATCH BASIN

Source: Bing, 2023

**Note**

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

**LANDAU**  
 ASSOCIATES

 North Harbor Diesel  
 Anacortes, WA

**Stormwater Site Map**  
**Existing Conditions M001 Area**

 Figure  
**3**

NHD000445

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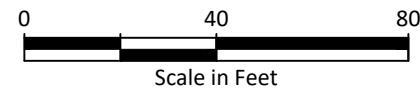




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**Legend**

- FACILITY BOUNDARY
- → STORMWATER AND STORMDRAIN FLOW DIRECTION
- STORMDRAIN
- CATCH BASIN

**Note**

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Source: Bing, 2023

North Harbor Diesel  
Anacortes, WA**Stormwater Site Map - Proposed  
M001 Area Treatment Improvements****Figure  
5**

**TABLE 1**  
**FACILITY STORMWATER MONITORING RESULTS**  
**NORTH HARBOR DIESEL - ANACORTES, WASHINGTON**

Page 1 of 2

OUTFALL: S001 (Main Gate)

Date	Turbidity (NTU)	Total Copper (µg/L)	Total Zinc (µg/L)
5/24/2021	--	704	791
10/15/2021	--	162	361
11/29/2021	--	92.4	174
4/28/2022	--	1,110	931
5/5/2022	--	87.2	159
11/29/2022	8.6	103	357
3/24/2023	18	108	167
Average	13.3	338	420
Maximum	18	1,110	931

OUTFALL: M001 (Launch Ramp Wash Pad/Gas Shop - **Note 1**)

Date	Turbidity (NTU)	Total Copper (µg/L)	Total Zinc (µg/L)
5/24/2021	--	309	678
10/15/2021	--	3,050	1,290
11/29/2021	--	82.3	116
4/28/2022	--	1,380	1,140
5/5/2022	--	759	292
11/29/2022	6.8	36	520
3/24/2023	55	482	254
Average	31	259	387
Maximum	55	482	520

**Abbreviations and Acronyms:**

-- = not applicable

µg/L = micrograms per liter

NTU = Nephelometric turbidity unit

**Notes:**

1. Prior to 11/29/2022, samples identified as Outfall M001 were collected from the boat wash pad (where there is zero discharge to surface water) rather than the current stormwater discharge monitoring point from the Gas Shop area.

**TABLE 2**  
**POLLUTANT REDUCTION NEEDED BY STORMWATER TREATMENT**  
**NORTH HARBOR DIESEL - ANACORTES, WASHINGTON**

Page 1 of 1

Sampling Point		Turbidity (NTU)	Total Copper (µg/L)	Total Zinc (µg/L)
Boatyard General Permit Benchmarks as of 9/1/2022:		25	44	90
<b>S001 (Main Gate)</b>	Average	13	338	420
	Maximum	18	1,110	931
	Average % Reduction Needed	0%	87%	79%
	Maximum % Reduction Needed	0%	96%	90%
<b>M001 (Gas Shop)</b>	Average	31	259	387
	Maximum	55	482	520
	Average % Reduction Needed	19%	83%	77%
	Maximum % Reduction Needed	55%	91%	83%



**TABLE 3**  
**EVALUATION AND SCREENING OF STORMWATER TREATMENT ALTERNATIVES**  
**NORTH HARBOR DIESEL - ANACORTES, WASHINGTON**

Stormwater Management/ Treatment Options	Effectiveness	Implementability	Cost
Media Filtration, aboveground Examples: - Bioretention soil (sand/compost) - Oyster shell flake - Granular activated carbon - Activated alumina - Vendor (StormwaterRx Aquip®)	If sized properly and if stormwater absent of heavy loading of fine solids, can remove 90 percent of total suspended solids (TSS), turbidity, copper, and zinc if media is maintained properly.	Would require installation of pump station vault and new electrical conduit. Media containers would take up a significant footprint. Media may become plugged with suspended solids before its metals uptake capacity is fully utilized, and maintenance of media could be challenging. Level of treatment can be adjusted by media selection.	Moderate capital cost. Low to moderate operational cost for periodic media replacement, depending on media mix and quickness of plugging by facility stormwater suspended solids.
Chitosan Enhanced Sand Filtration System (CESF)	Can remove 99 percent of suspended solids and associated metals. Can remove dissolved metals, if needed, with use of polyaluminum chloride. It handles heavier solids loading than other treatment types and would allow for future increased facility activity. Automated modular system provides ability to adjust future level of treatment.	Would require installation of pump station vault and new electrical conduit. Foot print of treatment is larger than other compact filtration systems. Automated modular systems are available quickly from vendors, including comprehensive out-sourced maintenance services.	Capital cost of a CESF system is considered moderate to high. The estimated operations and maintenance (O&M) costs are moderate to high considering operator labor and chemical use.
Media filtration, aboveground (see above for example media), with coagulation pretreatment using chitosan lactate	If sized properly, can remove 95+ percent of TSS, turbidity, copper, and zinc even if fine (small diameter) suspended solids are present, if coagulant and media both maintained properly.	Media filter containers would take up a significant footprint. Media may become plugged with suspended solids before its metals uptake capacity is fully utilized, and maintenance of media could be challenging. Level of treatment can be adjusted by media selection. Requires ongoing effluent testing for residual coagulant.	Moderate capital cost and moderate operational cost for periodic replacement of proprietary media. Labor for media clean should be considered in the cost.
Media Filtration Vaults (StormFilter® System)	If sized properly, can remove 80+ percent of TSS, turbidity, copper, and zinc, and would generally meet benchmark values if maintained.	The large vault units would need to be installed underground. Vertical drop between storm drain piping and outfall pipes is required and may be challenging for this retrofit application where the storm drains are already relatively low.	The estimated capital cost to install media filtration vaults is considered to be moderate to high. Requires annual media cartridge replacement servicing, which is considered to be moderate operational cost.

**TABLE 3**  
**EVALUATION AND SCREENING OF STORMWATER TREATMENT ALTERNATIVES**  
**NORTH HARBOR DIESEL - ANACORTES, WASHINGTON**

Stormwater Management/ Treatment Options	Effectiveness	Implementability	Cost
Electro-coagulation	An electro-coagulation system would act to remove both suspended solids and dissolved metals, and can achieve concentration reductions of 99 percent. However, provides higher level of treatment than necessary given the facility stormwater sampling results.	Would require installation of pump station vault and new electrical conduit. Foot print of these units is larger than other compact filtration systems. Potential for system upset and level of system repairs is not well established.	Capital cost of an electro-coagulation system is relatively high. The estimated O&M costs are moderate to high considering operator labor and electrical power.
Discharge to Sanitary Sewer	Would eliminate discharge to surface water and eliminate benchmark exceedances. Facility copper and zinc concentrations are already below sewer pretreatment standards.	Municipality will typically not accept stormwater into their sanitary sewer unless special authorization is granted. Anacortes is non-delegated; special authorization likely would only be granted by Ecology if determined to be technically infeasible to treat to surface water quality criteria.	Not deemed implementable, so cost not evaluated.
Infiltration Below Ground	Full infiltration of stormwater would eliminate discharge to surface water and eliminate benchmark exceedances. Maximum copper and zinc concentrations are already below groundwater protection standards.	Not considered to be an appropriate site for full stormwater infiltration given proximity to surface water, and shallow depth of groundwater.	Not considered implementable for full facility, so cost not evaluated.

APPENDIX A

---

# Hydrologic Modeling Output

**WWHM2012**  
**PROJECT REPORT**

## *General Model Information*

WWHM2012 Project Name: North Harbor Diesel

Site Name: North Harbor Diesel

Site Address:

City: Anacortes

Report Date: 5/25/2023

Gage: Burlington

Data Start: 1948/10/01

Data End: 2009/09/30

Timestep: 15 Minute

Precip Scale: 0.833

Version Date: 2023/01/27

Version: 4.2.19

## *POC Thresholds*

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Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year

---

---

Low Flow Threshold for POC2:	50 Percent of the 2 Year
High Flow Threshold for POC2:	50 Year

---

## *Landuse Basin Data*

### *Predeveloped Land Use*

#### M001

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
DRIVEWAYS FLAT	0.09
Impervious Total	0.09
Basin Total	0.09

S001

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
DRIVEWAYS FLAT	1.14
Impervious Total	1.14
Basin Total	1.14

M001

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
DRIVEWAYS FLAT	0.09
Impervious Total	0.09
Basin Total	0.09



S001

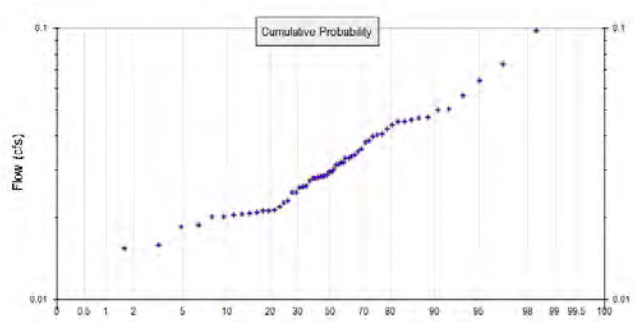
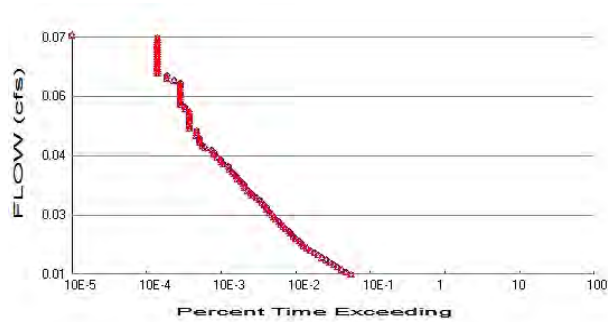
Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
DRIVEWAYS FLAT	1.14
Impervious Total	1.14
Basin Total	1.14

*Routing Elements*  
*Predeveloped Routing*



## Analysis Results

### POC 1



+ Predeveloped    x Mitigated

#### Predeveloped Landuse Totals for POC #1

Total Pervious Area: 0  
Total Impervious Area: 0.09

#### Mitigated Landuse Totals for POC #1

Total Pervious Area: 0  
Total Impervious Area: 0.09

Flow Frequency Method: Log Pearson Type III 17B

#### Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.029851
5 year	0.041863
10 year	0.050706
25 year	0.062927
50 year	0.072813
100 year	0.083389

#### Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0.029851
5 year	0.041863
10 year	0.050706
25 year	0.062927
50 year	0.072813
100 year	0.083389

### Annual Peaks

#### Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1949	0.044	0.044
1950	0.023	0.023
1951	0.038	0.038
1952	0.041	0.041
1953	0.046	0.046
1954	0.023	0.023
1955	0.021	0.021
1956	0.015	0.015
1957	0.045	0.045
1958	0.020	0.020

1959	0.021	0.021
1960	0.034	0.034
1961	0.021	0.021
1962	0.035	0.035
1963	0.022	0.022
1964	0.026	0.026
1965	0.064	0.064
1966	0.027	0.027
1967	0.050	0.050
1968	0.040	0.040
1969	0.020	0.020
1970	0.050	0.050
1971	0.030	0.030
1972	0.018	0.018
1973	0.033	0.033
1974	0.025	0.025
1975	0.047	0.047
1976	0.056	0.056
1977	0.025	0.025
1978	0.045	0.045
1979	0.028	0.028
1980	0.031	0.031
1981	0.029	0.029
1982	0.029	0.029
1983	0.026	0.026
1984	0.028	0.028
1985	0.036	0.036
1986	0.021	0.021
1987	0.021	0.021
1988	0.046	0.046
1989	0.031	0.031
1990	0.028	0.028
1991	0.041	0.041
1992	0.032	0.032
1993	0.016	0.016
1994	0.021	0.021
1995	0.019	0.019
1996	0.038	0.038
1997	0.074	0.074
1998	0.030	0.030
1999	0.015	0.015
2000	0.043	0.043
2001	0.028	0.028
2002	0.020	0.020
2003	0.026	0.026
2004	0.098	0.098
2005	0.034	0.034
2006	0.032	0.032
2007	0.029	0.029
2008	0.028	0.028
2009	0.033	0.033

### Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0978	0.0978
2	0.0740	0.0740
3	0.0640	0.0640

4	0.0563	0.0563
5	0.0505	0.0505
6	0.0500	0.0500
7	0.0468	0.0468
8	0.0464	0.0464
9	0.0458	0.0458
10	0.0453	0.0453
11	0.0453	0.0453
12	0.0441	0.0441
13	0.0425	0.0425
14	0.0406	0.0406
15	0.0405	0.0405
16	0.0400	0.0400
17	0.0384	0.0384
18	0.0379	0.0379
19	0.0357	0.0357
20	0.0351	0.0351
21	0.0342	0.0342
22	0.0336	0.0336
23	0.0331	0.0331
24	0.0331	0.0331
25	0.0321	0.0321
26	0.0320	0.0320
27	0.0315	0.0315
28	0.0313	0.0313
29	0.0302	0.0302
30	0.0296	0.0296
31	0.0295	0.0295
32	0.0287	0.0287
33	0.0286	0.0286
34	0.0284	0.0284
35	0.0284	0.0284
36	0.0281	0.0281
37	0.0280	0.0280
38	0.0279	0.0279
39	0.0273	0.0273
40	0.0261	0.0261
41	0.0260	0.0260
42	0.0258	0.0258
43	0.0248	0.0248
44	0.0247	0.0247
45	0.0231	0.0231
46	0.0227	0.0227
47	0.0220	0.0220
48	0.0213	0.0213
49	0.0211	0.0211
50	0.0211	0.0211
51	0.0208	0.0208
52	0.0207	0.0207
53	0.0206	0.0206
54	0.0204	0.0204
55	0.0202	0.0202
56	0.0202	0.0202
57	0.0188	0.0188
58	0.0185	0.0185
59	0.0158	0.0158
60	0.0154	0.0154
61	0.0149	0.0149



**Duration Flows**

The Facility PASSED

<b>Flow(cfs)</b>	<b>Predev</b>	<b>Mit</b>	<b>Percentage</b>	<b>Pass/Fail</b>
0.0149	1179	1179	100	Pass
0.0155	1003	1003	100	Pass
0.0161	881	881	100	Pass
0.0167	770	770	100	Pass
0.0173	691	691	100	Pass
0.0178	609	609	100	Pass
0.0184	548	548	100	Pass
0.0190	481	481	100	Pass
0.0196	424	424	100	Pass
0.0202	380	380	100	Pass
0.0208	330	330	100	Pass
0.0214	303	303	100	Pass
0.0219	273	273	100	Pass
0.0225	253	253	100	Pass
0.0231	236	236	100	Pass
0.0237	212	212	100	Pass
0.0243	198	198	100	Pass
0.0249	182	182	100	Pass
0.0255	174	174	100	Pass
0.0260	155	155	100	Pass
0.0266	147	147	100	Pass
0.0272	136	136	100	Pass
0.0278	128	128	100	Pass
0.0284	115	115	100	Pass
0.0290	109	109	100	Pass
0.0295	103	103	100	Pass
0.0301	95	95	100	Pass
0.0307	88	88	100	Pass
0.0313	86	86	100	Pass
0.0319	80	80	100	Pass
0.0325	76	76	100	Pass
0.0331	69	69	100	Pass
0.0336	63	63	100	Pass
0.0342	56	56	100	Pass
0.0348	53	53	100	Pass
0.0354	49	49	100	Pass
0.0360	44	44	100	Pass
0.0366	44	44	100	Pass
0.0371	42	42	100	Pass
0.0377	39	39	100	Pass
0.0383	36	36	100	Pass
0.0389	34	34	100	Pass
0.0395	32	32	100	Pass
0.0401	30	30	100	Pass
0.0407	28	28	100	Pass
0.0412	27	27	100	Pass
0.0418	23	23	100	Pass
0.0424	22	22	100	Pass
0.0430	21	21	100	Pass
0.0436	19	19	100	Pass
0.0442	17	17	100	Pass
0.0447	17	17	100	Pass
0.0453	16	16	100	Pass



0.0459	13	13	100	Pass
0.0465	12	12	100	Pass
0.0471	11	11	100	Pass
0.0477	11	11	100	Pass
0.0483	11	11	100	Pass
0.0488	10	10	100	Pass
0.0494	10	10	100	Pass
0.0500	10	10	100	Pass
0.0506	8	8	100	Pass
0.0512	8	8	100	Pass
0.0518	8	8	100	Pass
0.0523	8	8	100	Pass
0.0529	8	8	100	Pass
0.0535	8	8	100	Pass
0.0541	8	8	100	Pass
0.0547	8	8	100	Pass
0.0553	7	7	100	Pass
0.0559	7	7	100	Pass
0.0564	6	6	100	Pass
0.0570	6	6	100	Pass
0.0576	6	6	100	Pass
0.0582	6	6	100	Pass
0.0588	6	6	100	Pass
0.0594	6	6	100	Pass
0.0599	6	6	100	Pass
0.0605	6	6	100	Pass
0.0611	6	6	100	Pass
0.0617	6	6	100	Pass
0.0623	5	5	100	Pass
0.0629	4	4	100	Pass
0.0635	4	4	100	Pass
0.0640	3	3	100	Pass
0.0646	3	3	100	Pass
0.0652	3	3	100	Pass
0.0658	3	3	100	Pass
0.0664	3	3	100	Pass
0.0670	3	3	100	Pass
0.0676	3	3	100	Pass
0.0681	3	3	100	Pass
0.0687	3	3	100	Pass
0.0693	3	3	100	Pass
0.0699	3	3	100	Pass
0.0705	3	3	100	Pass
0.0711	3	3	100	Pass
0.0716	3	3	100	Pass
0.0722	3	3	100	Pass
0.0728	3	3	100	Pass

## Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume: 0.0081 acre-feet

On-line facility target flow: 0.0119 cfs.

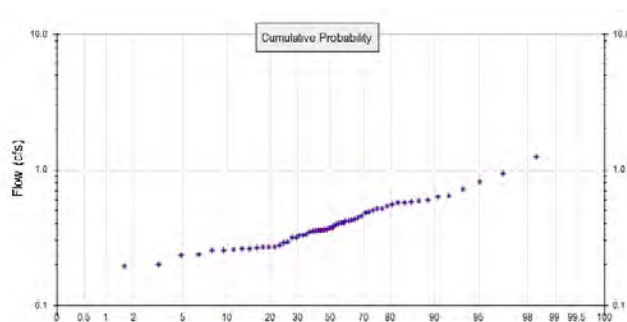
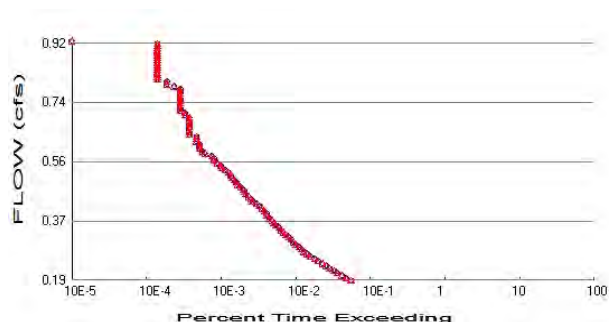
Adjusted for 15 min: 0.0119 cfs.

Off-line facility target flow: 0.0067 cfs.

Adjusted for 15 min: 0.0067 cfs.

LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment
Total Volume Infiltrated		0.00	0.00	0.00		0.00	0.00	0%	No Treat Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Passed

## POC 2



+ Predeveloped x Mitigated

## Predeveloped Landuse Totals for POC #2

Total Pervious Area: 0  
Total Impervious Area: 1.14

## Mitigated Landuse Totals for POC #2

Total Pervious Area: 0  
Total Impervious Area: 1.14

Flow Frequency Method: Log Pearson Type III 17B

## Flow Frequency Return Periods for Predeveloped. POC #2

Return Period	Flow(cfs)
2 year	0.378108
5 year	0.530263
10 year	0.642282
25 year	0.797073
50 year	0.922297
100 year	1.056261

## Flow Frequency Return Periods for Mitigated. POC #2

Return Period	Flow(cfs)
2 year	0.378108
5 year	0.530263
10 year	0.642282
25 year	0.797073
50 year	0.922297
100 year	1.056261

## Annual Peaks

## Annual Peaks for Predeveloped and Mitigated. POC #2

Year	Predeveloped	Mitigated
1949	0.559	0.559
1950	0.292	0.292
1951	0.480	0.480
1952	0.514	0.514
1953	0.580	0.580
1954	0.288	0.288
1955	0.270	0.270
1956	0.195	0.195
1957	0.574	0.574
1958	0.256	0.256
1959	0.268	0.268

1960	0.433	0.433
1961	0.263	0.263
1962	0.445	0.445
1963	0.278	0.278
1964	0.330	0.330
1965	0.810	0.810
1966	0.346	0.346
1967	0.639	0.639
1968	0.506	0.506
1969	0.256	0.256
1970	0.634	0.634
1971	0.374	0.374
1972	0.234	0.234
1973	0.419	0.419
1974	0.314	0.314
1975	0.593	0.593
1976	0.713	0.713
1977	0.313	0.313
1978	0.573	0.573
1979	0.354	0.354
1980	0.397	0.397
1981	0.362	0.362
1982	0.373	0.373
1983	0.331	0.331
1984	0.356	0.356
1985	0.452	0.452
1986	0.261	0.261
1987	0.264	0.264
1988	0.588	0.588
1989	0.399	0.399
1990	0.359	0.359
1991	0.514	0.514
1992	0.406	0.406
1993	0.200	0.200
1994	0.268	0.268
1995	0.238	0.238
1996	0.487	0.487
1997	0.937	0.937
1998	0.382	0.382
1999	0.189	0.189
2000	0.539	0.539
2001	0.353	0.353
2002	0.259	0.259
2003	0.327	0.327
2004	1.238	1.238
2005	0.426	0.426
2006	0.406	0.406
2007	0.364	0.364
2008	0.360	0.360
2009	0.420	0.420

### Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #2

Rank	Predeveloped	Mitigated
1	1.2382	1.2382
2	0.9369	0.9369
3	0.8104	0.8104
4	0.7129	0.7129

5	0.6395	0.6395
6	0.6337	0.6337
7	0.5927	0.5927
8	0.5881	0.5881
9	0.5803	0.5803
10	0.5743	0.5743
11	0.5734	0.5734
12	0.5588	0.5588
13	0.5389	0.5389
14	0.5143	0.5143
15	0.5135	0.5135
16	0.5060	0.5060
17	0.4866	0.4866
18	0.4797	0.4797
19	0.4523	0.4523
20	0.4450	0.4450
21	0.4327	0.4327
22	0.4256	0.4256
23	0.4196	0.4196
24	0.4191	0.4191
25	0.4063	0.4063
26	0.4056	0.4056
27	0.3988	0.3988
28	0.3969	0.3969
29	0.3824	0.3824
30	0.3745	0.3745
31	0.3732	0.3732
32	0.3640	0.3640
33	0.3619	0.3619
34	0.3599	0.3599
35	0.3593	0.3593
36	0.3557	0.3557
37	0.3541	0.3541
38	0.3532	0.3532
39	0.3464	0.3464
40	0.3312	0.3312
41	0.3298	0.3298
42	0.3266	0.3266
43	0.3144	0.3144
44	0.3129	0.3129
45	0.2924	0.2924
46	0.2880	0.2880
47	0.2784	0.2784
48	0.2701	0.2701
49	0.2677	0.2677
50	0.2676	0.2676
51	0.2641	0.2641
52	0.2626	0.2626
53	0.2607	0.2607
54	0.2586	0.2586
55	0.2558	0.2558
56	0.2556	0.2556
57	0.2382	0.2382
58	0.2343	0.2343
59	0.2003	0.2003
60	0.1955	0.1955
61	0.1885	0.1885



## Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.1891	1179	1179	100	Pass
0.1965	1016	1016	100	Pass
0.2039	894	894	100	Pass
0.2113	771	771	100	Pass
0.2187	700	700	100	Pass
0.2261	609	609	100	Pass
0.2335	552	552	100	Pass
0.2409	489	489	100	Pass
0.2483	424	424	100	Pass
0.2557	384	384	100	Pass
0.2631	331	331	100	Pass
0.2705	306	306	100	Pass
0.2779	275	275	100	Pass
0.2853	254	254	100	Pass
0.2927	238	238	100	Pass
0.3002	213	213	100	Pass
0.3076	199	199	100	Pass
0.3150	184	184	100	Pass
0.3224	174	174	100	Pass
0.3298	158	158	100	Pass
0.3372	147	147	100	Pass
0.3446	137	137	100	Pass
0.3520	128	128	100	Pass
0.3594	116	116	100	Pass
0.3668	109	109	100	Pass
0.3742	104	104	100	Pass
0.3816	95	95	100	Pass
0.3890	88	88	100	Pass
0.3964	86	86	100	Pass
0.4038	81	81	100	Pass
0.4112	76	76	100	Pass
0.4187	69	69	100	Pass
0.4261	63	63	100	Pass
0.4335	56	56	100	Pass
0.4409	53	53	100	Pass
0.4483	50	50	100	Pass
0.4557	45	45	100	Pass
0.4631	44	44	100	Pass
0.4705	42	42	100	Pass
0.4779	39	39	100	Pass
0.4853	36	36	100	Pass
0.4927	34	34	100	Pass
0.5001	32	32	100	Pass
0.5075	30	30	100	Pass
0.5149	29	29	100	Pass
0.5223	27	27	100	Pass
0.5298	24	24	100	Pass
0.5372	22	22	100	Pass
0.5446	21	21	100	Pass
0.5520	19	19	100	Pass
0.5594	17	17	100	Pass
0.5668	17	17	100	Pass
0.5742	16	16	100	Pass



0.5816	13	13	100	Pass
0.5890	12	12	100	Pass
0.5964	11	11	100	Pass
0.6038	11	11	100	Pass
0.6112	11	11	100	Pass
0.6186	10	10	100	Pass
0.6260	10	10	100	Pass
0.6334	10	10	100	Pass
0.6409	8	8	100	Pass
0.6483	8	8	100	Pass
0.6557	8	8	100	Pass
0.6631	8	8	100	Pass
0.6705	8	8	100	Pass
0.6779	8	8	100	Pass
0.6853	8	8	100	Pass
0.6927	8	8	100	Pass
0.7001	7	7	100	Pass
0.7075	7	7	100	Pass
0.7149	6	6	100	Pass
0.7223	6	6	100	Pass
0.7297	6	6	100	Pass
0.7371	6	6	100	Pass
0.7445	6	6	100	Pass
0.7519	6	6	100	Pass
0.7594	6	6	100	Pass
0.7668	6	6	100	Pass
0.7742	6	6	100	Pass
0.7816	6	6	100	Pass
0.7890	5	5	100	Pass
0.7964	4	4	100	Pass
0.8038	4	4	100	Pass
0.8112	3	3	100	Pass
0.8186	3	3	100	Pass
0.8260	3	3	100	Pass
0.8334	3	3	100	Pass
0.8408	3	3	100	Pass
0.8482	3	3	100	Pass
0.8556	3	3	100	Pass
0.8630	3	3	100	Pass
0.8705	3	3	100	Pass
0.8779	3	3	100	Pass
0.8853	3	3	100	Pass
0.8927	3	3	100	Pass
0.9001	3	3	100	Pass
0.9075	3	3	100	Pass
0.9149	3	3	100	Pass
0.9223	3	3	100	Pass

## Water Quality

Water Quality BMP Flow and Volume for POC #2

On-line facility volume: 0.1029 acre-feet

On-line facility target flow: 0.1509 cfs.

Adjusted for 15 min: 0.1509 cfs.

Off-line facility target flow: 0.0856 cfs.

Adjusted for 15 min: 0.0856 cfs.

LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment
Total Volume Infiltrated		0.00	0.00	0.00		0.00	0.00	0%	No Treat Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Passed

## *Model Default Modifications*

Total of 0 changes have been made.

### *PERLND Changes*

No PERLND changes have been made.

### *IMPLND Changes*

No IMPLND changes have been made.

## Appendix

### Predeveloped Schematic





*Predeveloped UCI File*

RUN

GLOBAL

```

WWM4 model simulation
START      1948 10 01      END      2009 09 30
RUN INTERP OUTPUT LEVEL    3      0
RESUME     0 RUN          1          UNIT SYSTEM      1
END GLOBAL

```

FILES

```

<File>  <Un#>  <-----File Name----->***
<-ID->                                     ***
WDM      26     North Harbor Diesel.wdm
MESSU    25     PreNorth Harbor Diesel.MES
          27     PreNorth Harbor Diesel.L61
          28     PreNorth Harbor Diesel.L62
          30     POCNorth Harbor Diesel1.dat
          31     POCNorth Harbor Diesel2.dat

```

END FILES

OPN SEQUENCE

```

INGRP          INDELT 00:15
  IMPLND        5
  COPY          501
  COPY          502
  DISPLY        1
  DISPLY        2

```

END INGRP

END OPN SEQUENCE

DISPLY

DISPLY-INFO1

```

# - #<-----Title----->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
1      M001                      MAX          1    2    30    9
2      S001                      MAX          1    2    31    9

```

END DISPLY-INFO1

END DISPLY

COPY

TIMESERIES

```

# - # NPT NMN ***
1      1    1
501     1    1
502     1    1

```

END TIMESERIES

END COPY

GENER

OPCODE

```

#      # OPCODE ***

```

END OPCODE

PARM

```

#      #          K ***

```

END PARM

END GENER

PERLND

GEN-INFO

```

<PLS ><-----Name----->NBLKS  Unit-systems  Printer ***
# - #                               User  t-series Engl Metr ***
                               in  out          ***

```

END GEN-INFO

\*\*\* Section PWATER\*\*\*

ACTIVITY

```

<PLS > ***** Active Sections *****
# - # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***

```

END ACTIVITY

PRINT-INFO

```

<PLS > ***** Print-flags ***** PIVL  PYR
# - # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *****

```

```

END PRINT-INFO

PWAT-PARM1
  <PLS > PWATER variable monthly parameter value flags ***
  # - # CSNO RTOP UZFG VCS VUZ VNN VIFW VIRC VLE INFC HWT ***
END PWAT-PARM1

PWAT-PARM2
  <PLS > PWATER input info: Part 2 ***
  # - # ***FOREST LZSN INFILT LSUR SLSUR KVARV AGWRC
END PWAT-PARM2

PWAT-PARM3
  <PLS > PWATER input info: Part 3 ***
  # - # ***PETMAX PETMIN INFEXP INFILD DEEPFR BASETP AGWETP
END PWAT-PARM3

PWAT-PARM4
  <PLS > PWATER input info: Part 4 ***
  # - # CEPSC UZSN NSUR INTFW IRC LZETP ***
END PWAT-PARM4

PWAT-STATE1
  <PLS > *** Initial conditions at start of simulation
  ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
  # - # *** CEPSC SURS UZS IFWS LZS AGWS GWVS
END PWAT-STATE1

END PERLND

IMPLND
GEN-INFO
  <PLS ><-----Name-----> Unit-systems Printer ***
  # - # User t-series Engl Metr ***
  in out ***
  5 DRIVEWAYS/FLAT 1 1 1 27 0
END GEN-INFO
*** Section IWATER***

ACTIVITY
  <PLS > ***** Active Sections *****
  # - # ATMP SNOW IWAT SLD IWG IQAL ***
  5 0 0 1 0 0 0
END ACTIVITY

PRINT-INFO
  <ILS > ***** Print-flags ***** PIVL PYR
  # - # ATMP SNOW IWAT SLD IWG IQAL *****
  5 0 0 4 0 0 4 1 9
END PRINT-INFO

IWAT-PARM1
  <PLS > IWATER variable monthly parameter value flags ***
  # - # CSNO RTOP VRS VNN RTLI ***
  5 0 0 0 0
END IWAT-PARM1

IWAT-PARM2
  <PLS > IWATER input info: Part 2 ***
  # - # *** LSUR SLSUR NSUR RETSC
  5 400 0.01 0.1 0.1
END IWAT-PARM2

IWAT-PARM3
  <PLS > IWATER input info: Part 3 ***
  # - # ***PETMAX PETMIN
  5 0 0
END IWAT-PARM3

IWAT-STATE1
  <PLS > *** Initial conditions at start of simulation

```



```

# - # *** RETS      SURS
5      0      0
END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->          <--Area-->      <-Target->      MBLK      ***
<Name> #          <-factor->      <Name> #      Tbl#      ***
M001***
IMPLND  5          0.09      COPY  501      15
S001***
IMPLND  5          1.14      COPY  502      15

*****Routing*****
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member-> ***
<Name> #      <Name> # #<-factor->strg <Name> # #      <Name> # #      ***
COPY  501 OUTPUT MEAN  1 1  48.4      DISPLY  1      INPUT TIMSER 1
COPY  502 OUTPUT MEAN  1 1  48.4      DISPLY  2      INPUT TIMSER 1

<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member-> ***
<Name> #      <Name> # #<-factor->strg <Name> # #      <Name> # #      ***
END NETWORK

RCHRES
GEN-INFO
RCHRES      Name      Nexits      Unit Systems      Printer      ***
# - #<-----><-----> User T-series Engl Metr LKFG      ***
in out      ***

END GEN-INFO
*** Section RCHRES***

ACTIVITY
<PLS > ***** Active Sections *****
# - # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
END ACTIVITY

PRINT-INFO
<PLS > ***** Print-flags ***** PIVL PYR
# - # HYDR ADCA CONS HEAT SED GQL OXRX NUTR PLNK PHCB PIVL PYR *****
END PRINT-INFO

HYDR-PARM1
RCHRES      Flags for each HYDR Section      ***
# - # VC A1 A2 A3 ODFVFG for each *** ODGTFG for each      FUNCT for each
FG FG FG FG possible exit *** possible exit      possible exit
* * * * * * * * * * * * * * * * * * * * * *
END HYDR-PARM1

HYDR-PARM2
# - # FTABNO      LEN      DELTH      STCOR      KS      DB50      ***
<-----><-----><-----><-----><-----><-----><----->      ***
END HYDR-PARM2

HYDR-INIT
RCHRES      Initial conditions for each HYDR section      ***
# - # *** VOL      Initial value of COLIND      Initial value of OUTDGT
*** ac-ft      for each possible exit      for each possible exit
<-----><----->      <-----><-----><-----><-----> *** <-----><-----><-----><----->
END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

```

## EXT SOURCES

<-Volume->	<Member>	SsysSgap<--Mult-->	Tran	<-Target	vols>	<-Grp>	<-Member->	***
<Name>	#	<Name>	#	tem strg<-factor->	strg	<Name>	#	#
WDM	2	PREC	ENGL	0.833		PERLND	1	999
WDM	2	PREC	ENGL	0.833		IMPLND	1	999
WDM	1	EVAP	ENGL	0.76		PERLND	1	999
WDM	1	EVAP	ENGL	0.76		IMPLND	1	999

END EXT SOURCES

## EXT TARGETS

<-Volume->	<-Grp>	<-Member->	<--Mult-->	Tran	<-Volume->	<Member>	Tsys	Tgap	Amd	***
<Name>	#	<Name>	#	#<-factor->	strg	<Name>	#	<Name>	tem strg	strg
COPY	501	OUTPUT	MEAN	1	1	48.4	WDM	501	FLOW	ENGL
COPY	502	OUTPUT	MEAN	1	1	48.4	WDM	502	FLOW	ENGL

END EXT TARGETS

## MASS-LINK

<Volume>	<-Grp>	<-Member->	<--Mult-->	<Target>	<-Grp>	<-Member->	***
<Name>	#	<Name>	#	<-factor->	<Name>	#	#
MASS-LINK		15					
IMPLND	IWATER	SURO		0.083333	COPY	INPUT	MEAN
END MASS-LINK		15					

END MASS-LINK

END RUN

*Mitigated UCI File*

RUN

GLOBAL

```

WWMH4 model simulation
START      1948 10 01      END      2009 09 30
RUN INTERP OUTPUT LEVEL    3      0
RESUME     0 RUN          1
UNIT SYSTEM                1
END GLOBAL

```

FILES

```

<File>  <Un#>  <-----File Name----->***
<-ID->                                     ***
WDM      26     North Harbor Diesel.wdm
MESSU    25     MitNorth Harbor Diesel.MES
          27     MitNorth Harbor Diesel.L61
          28     MitNorth Harbor Diesel.L62
          30     POCNorth Harbor Diesel1.dat
          31     POCNorth Harbor Diesel2.dat

```

END FILES

OPN SEQUENCE

```

INGRP          INDELT 00:15
  IMPLND        5
  COPY          501
  COPY          502
  DISPLY        1
  DISPLY        2
END INGRP

```

END OPN SEQUENCE

DISPLY

DISPLY-INFO1

```

# - #<-----Title----->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
1      M001                      MAX          1    2    30    9
2      S001                      MAX          1    2    31    9

```

END DISPLY-INFO1

END DISPLY

COPY

TIMESERIES

```

# - # NPT NMN ***
1      1    1
501     1    1
502     1    1

```

END TIMESERIES

END COPY

GENER

OPCODE

```

#      # OPCD ***

```

END OPCODE

PARM

```

#      #          K ***

```

END PARM

END GENER

PERLND

GEN-INFO

```

<PLS ><-----Name----->NBLKS  Unit-systems  Printer ***
# - #                               User  t-series  Engl Metr ***
                               in   out          ***

```

END GEN-INFO

\*\*\* Section PWATER\*\*\*

ACTIVITY

```

<PLS > ***** Active Sections *****
# - # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***

```

END ACTIVITY

PRINT-INFO

```

<PLS > ***** Print-flags ***** PIVL  PYR
# - # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *****

```

```

END PRINT-INFO

PWAT-PARM1
  <PLS > PWATER variable monthly parameter value flags ***
  # - # CSNO RTOP UZFG VCS VUZ VNN VIFW VIRC VLE INFC HWT ***
END PWAT-PARM1

PWAT-PARM2
  <PLS > PWATER input info: Part 2 ***
  # - # ***FOREST LZSN INFILT LSUR SLSUR KVARV AGWRC
END PWAT-PARM2

PWAT-PARM3
  <PLS > PWATER input info: Part 3 ***
  # - # ***PETMAX PETMIN INFEXP INFILD DEEPFR BASETP AGWETP
END PWAT-PARM3

PWAT-PARM4
  <PLS > PWATER input info: Part 4 ***
  # - # CEPSC UZSN NSUR INTFW IRC LZETP ***
END PWAT-PARM4

PWAT-STATE1
  <PLS > *** Initial conditions at start of simulation
  ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
  # - # *** CEPS SURS UZS IFWS LZS AGWS GWVS
END PWAT-STATE1

END PERLND

IMPLND
GEN-INFO
  <PLS ><-----Name-----> Unit-systems Printer ***
  # - # User t-series Engr Metr ***
  in out ***
  5 DRIVEWAYS/FLAT 1 1 1 27 0
END GEN-INFO
*** Section IWATER***

ACTIVITY
  <PLS > ***** Active Sections *****
  # - # ATMP SNOW IWAT SLD IWG IQAL ***
  5 0 0 1 0 0 0
END ACTIVITY

PRINT-INFO
  <ILS > ***** Print-flags ***** PIVL PYR
  # - # ATMP SNOW IWAT SLD IWG IQAL *****
  5 0 0 4 0 0 4 1 9
END PRINT-INFO

IWAT-PARM1
  <PLS > IWATER variable monthly parameter value flags ***
  # - # CSNO RTOP VRS VNN RTLI ***
  5 0 0 0 0
END IWAT-PARM1

IWAT-PARM2
  <PLS > IWATER input info: Part 2 ***
  # - # *** LSUR SLSUR NSUR RETSC
  5 400 0.01 0.1 0.1
END IWAT-PARM2

IWAT-PARM3
  <PLS > IWATER input info: Part 3 ***
  # - # ***PETMAX PETMIN
  5 0 0
END IWAT-PARM3

IWAT-STATE1
  <PLS > *** Initial conditions at start of simulation

```

```

# - # *** RETS      SURS
5      0      0
END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->          <--Area-->      <-Target->      MBLK      ***
<Name> #          <-factor->      <Name> #      Tbl#      ***
M001***
IMPLND  5          0.09      COPY  501      15
S001***
IMPLND  5          1.14      COPY  502      15

*****Routing*****
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member-> ***
<Name> #      <Name> # #<-factor->strg <Name> # #      <Name> # #      ***
COPY  501 OUTPUT MEAN  1 1  48.4      DISPLY  1      INPUT TIMSER 1
COPY  502 OUTPUT MEAN  1 1  48.4      DISPLY  2      INPUT TIMSER 1

<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member-> ***
<Name> #      <Name> # #<-factor->strg <Name> # #      <Name> # #      ***
END NETWORK

RCHRES
GEN-INFO
RCHRES      Name      Nexits      Unit Systems      Printer      ***
# - #<-----><----> User T-series Engl Metr LKFG      ***
in out      ***

END GEN-INFO
*** Section RCHRES***

ACTIVITY
<PLS > ***** Active Sections *****
# - # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
END ACTIVITY

PRINT-INFO
<PLS > ***** Print-flags ***** PIVL PYR
# - # HYDR ADCA CONS HEAT SED GQL OXRX NUTR PLNK PHCB PIVL PYR *****
END PRINT-INFO

HYDR-PARM1
RCHRES      Flags for each HYDR Section      ***
# - # VC A1 A2 A3 ODFVFG for each *** ODGTFG for each      FUNCT for each
FG FG FG FG possible exit *** possible exit      possible exit
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
END HYDR-PARM1

HYDR-PARM2
# - # FTABNO      LEN      DELTH      STCOR      KS      DB50      ***
<-----><-----><-----><-----><-----><-----><----->      ***
END HYDR-PARM2

HYDR-INIT
RCHRES      Initial conditions for each HYDR section      ***
# - # *** VOL      Initial value of COLIND      Initial value of OUTDGT
*** ac-ft      for each possible exit      for each possible exit
<-----><----->      <----><----><----><----><----> *** <----><----><----><----><---->
END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

```

## EXT SOURCES

<-Volume->	<Member>	SsysSgap<--Mult-->	Tran	<-Target	vols>	<-Grp>	<-Member->	***
<Name>	#	<Name>	#	tem strg<-factor->	strg	<Name>	#	#
WDM	2	PREC	ENGL	0.833		PERLND	1	999
WDM	2	PREC	ENGL	0.833		IMPLND	1	999
WDM	1	EVAP	ENGL	0.76		PERLND	1	999
WDM	1	EVAP	ENGL	0.76		IMPLND	1	999

END EXT SOURCES

## EXT TARGETS

<-Volume->	<-Grp>	<-Member->	<--Mult-->	Tran	<-Volume->	<Member>	Tsys	Tgap	Amd	***
<Name>	#	<Name>	#	#<-factor->	strg	<Name>	#	<Name>	tem strg	strg***
COPY	1	OUTPUT	MEAN	1	1	48.4	WDM	701	FLOW	ENGL
COPY	501	OUTPUT	MEAN	1	1	48.4	WDM	801	FLOW	ENGL
COPY	2	OUTPUT	MEAN	1	1	48.4	WDM	702	FLOW	ENGL
COPY	502	OUTPUT	MEAN	1	1	48.4	WDM	802	FLOW	ENGL

END EXT TARGETS

## MASS-LINK

<Volume>	<-Grp>	<-Member->	<--Mult-->	<Target>	<-Grp>	<-Member->	***
<Name>		<Name>	#	#<-factor->	<Name>		<Name>
MASS-LINK		15					
IMPLND	IWATER	SURO		0.083333	COPY	INPUT	MEAN
END MASS-LINK		15					

END MASS-LINK

END RUN

*Predeveloped HSPF Message File*

*Mitigated HSPF Message File*



## *Disclaimer*

### *Legal Notice*

This program and accompanying documentation is provided 'as-is' without warranty of any kind. The entire risk regarding the performance and results of this program is assumed by the user. Clear Creek Solutions, Inc. disclaims all warranties, either expressed or implied, including but not limited to implied warranties of program and accompanying documentation. In no event shall Clear Creek Solutions, Inc. be liable for any damages whatsoever (including without limitation to damages for loss of business profits, loss of business information, business interruption, and the like) arising out of the use of, or inability to use this program even if Clear Creek Solutions, Inc. has been advised of the possibility of such damages.

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Olympia, WA. 98501  
Toll Free 1(866)943-0304  
Local (360)943-0304

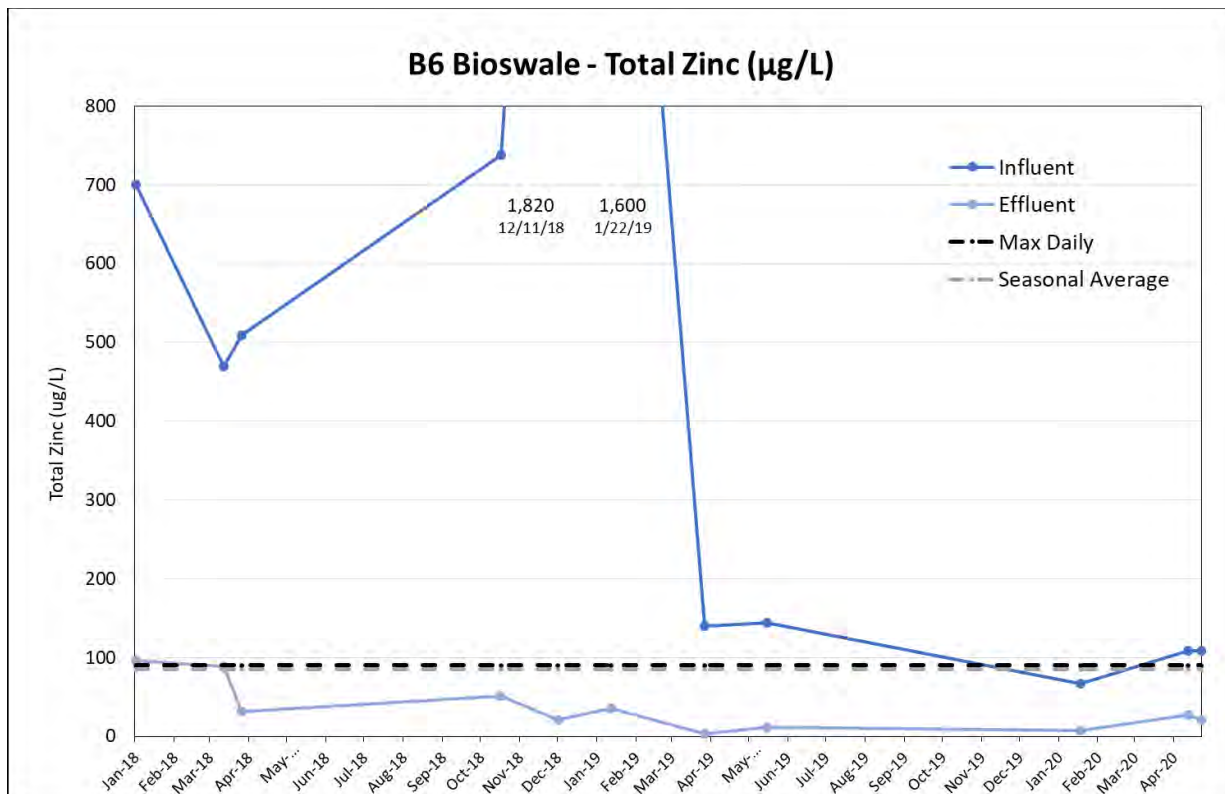
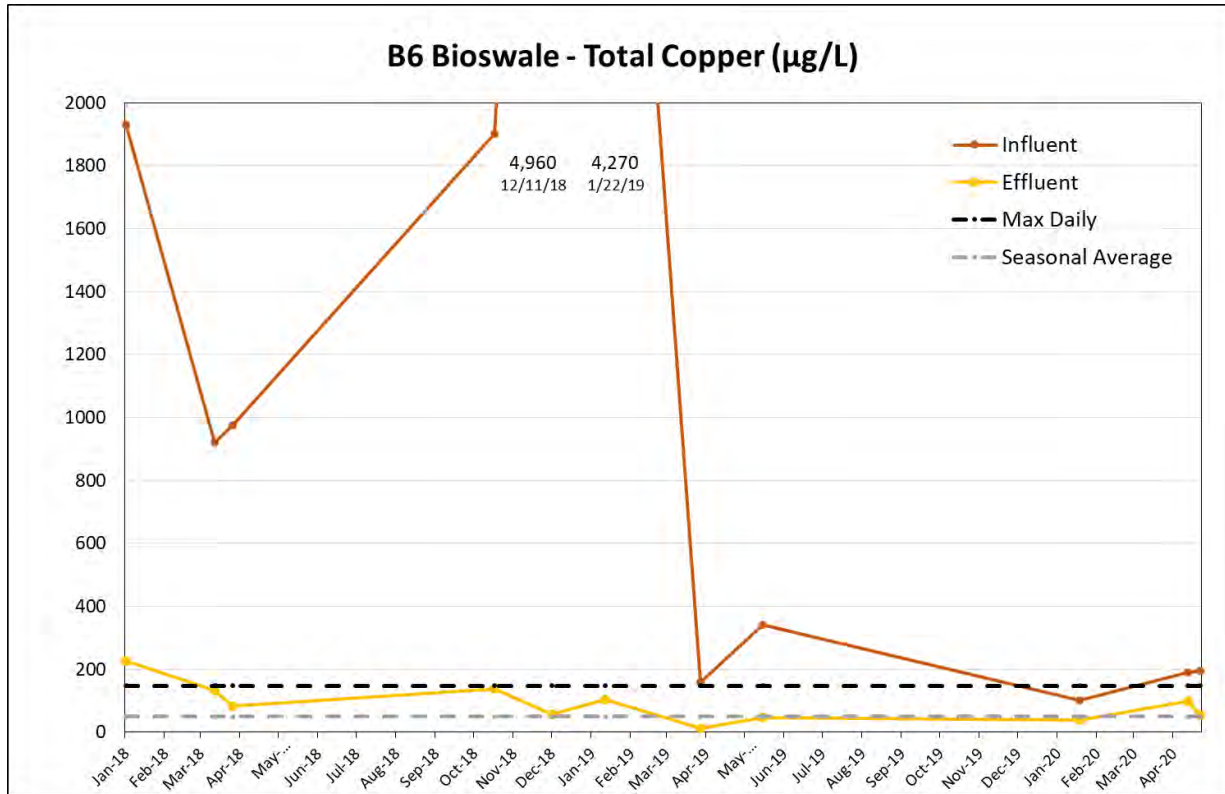
[www.clearcreeksolutions.com](http://www.clearcreeksolutions.com)

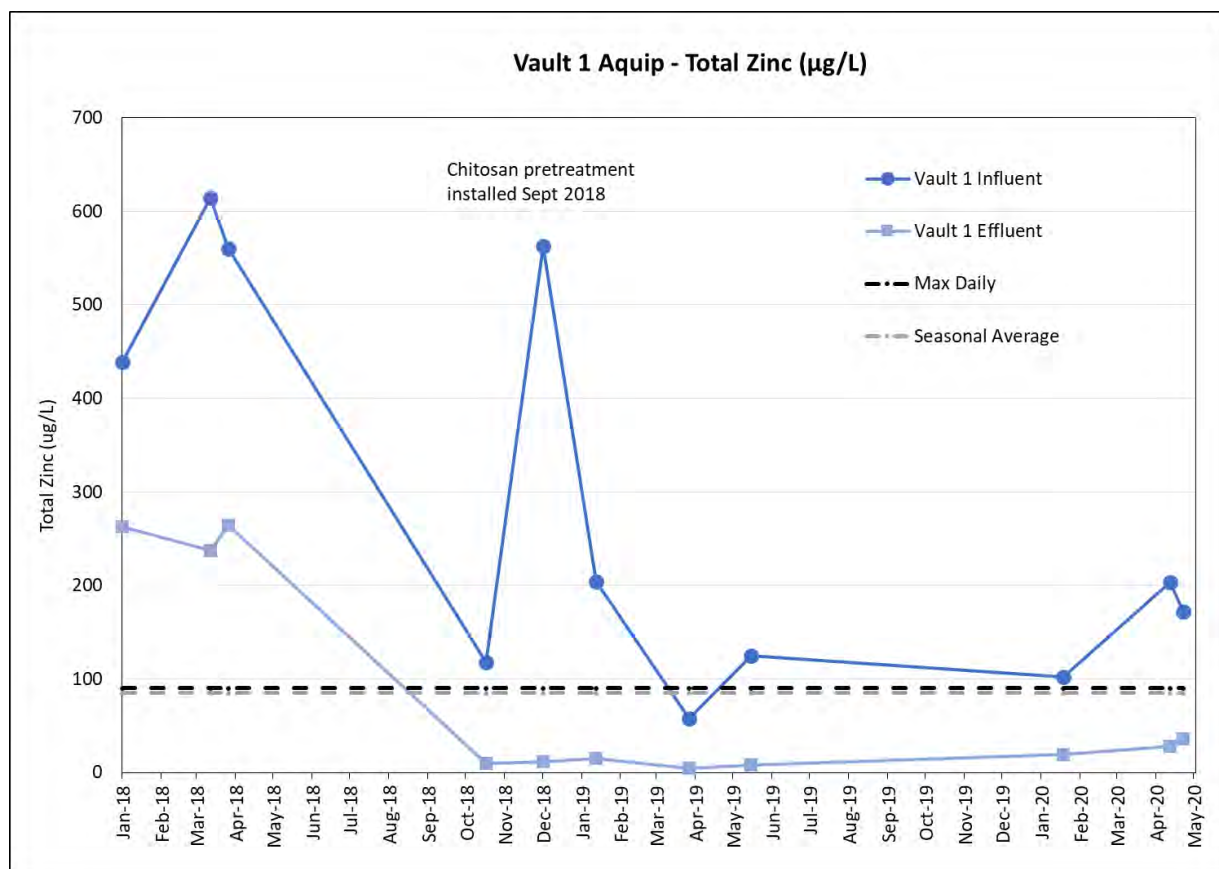
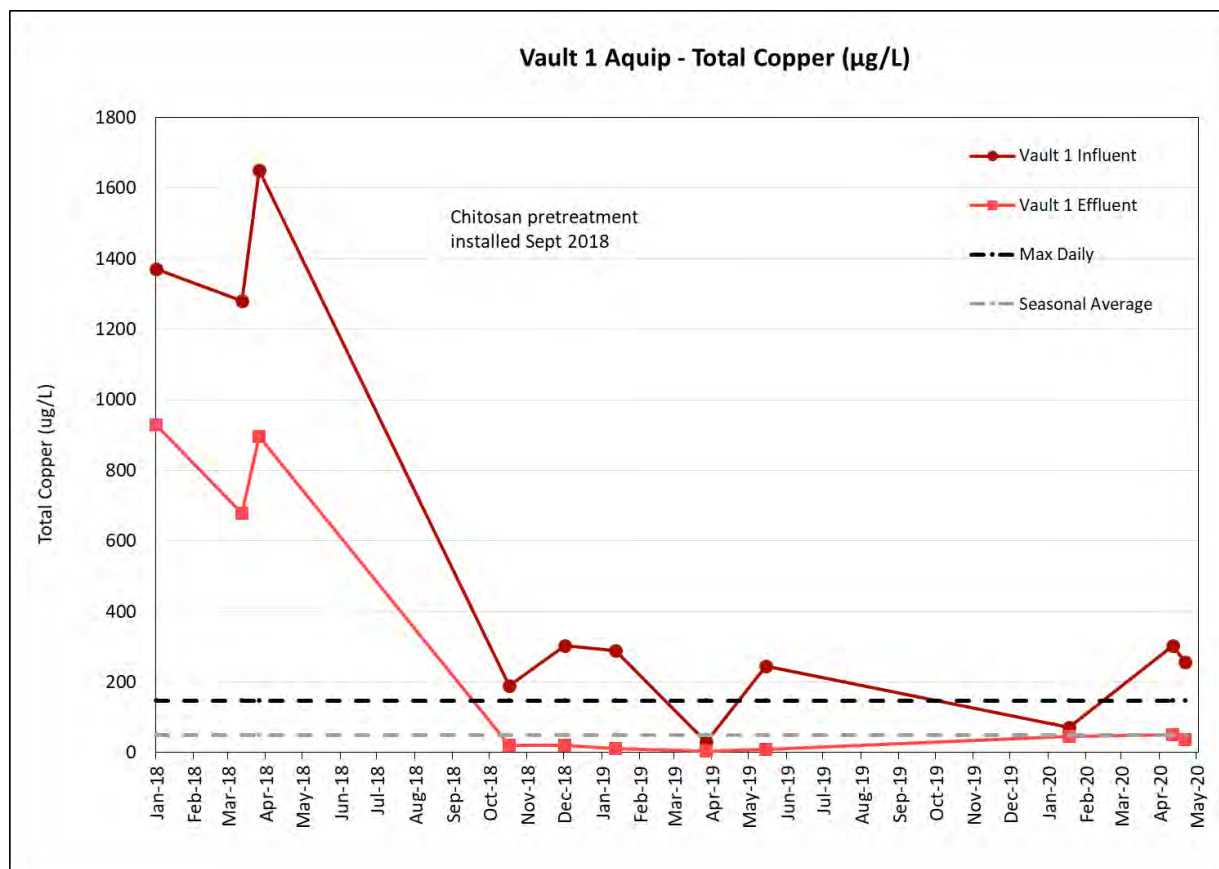
APPENDIX B

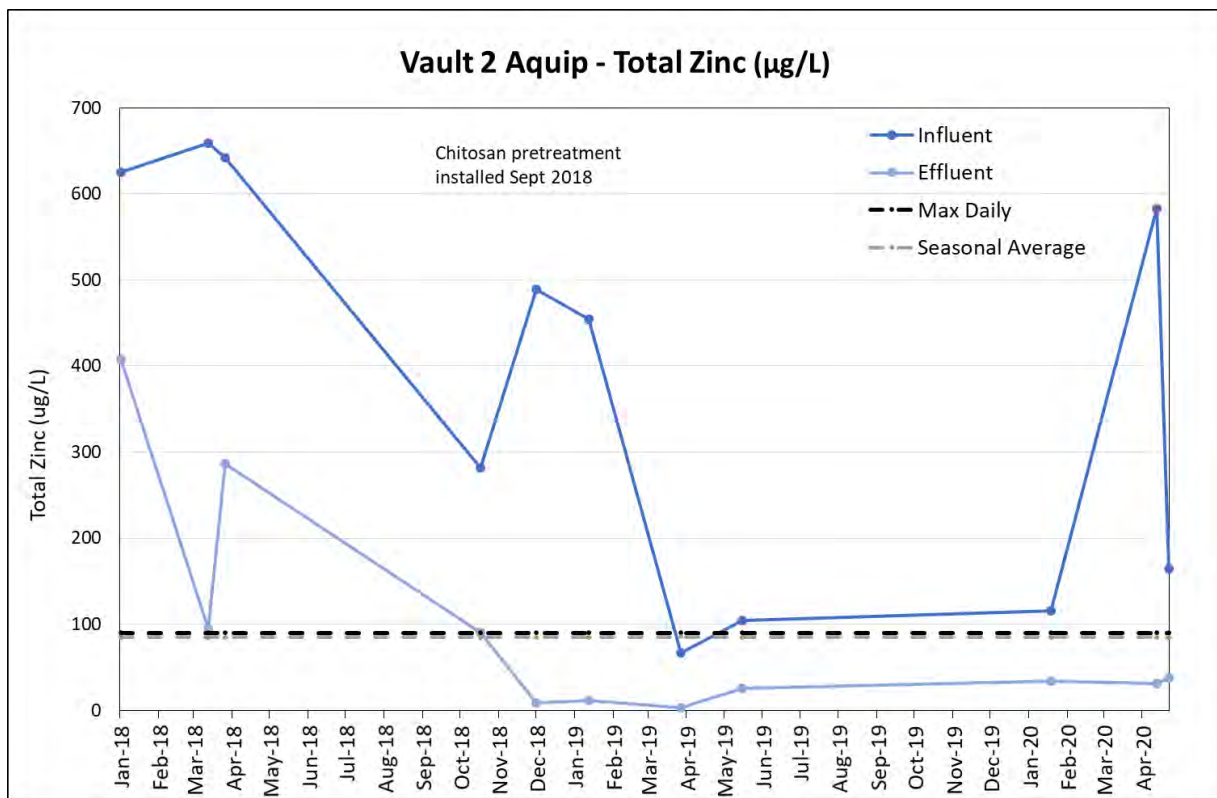
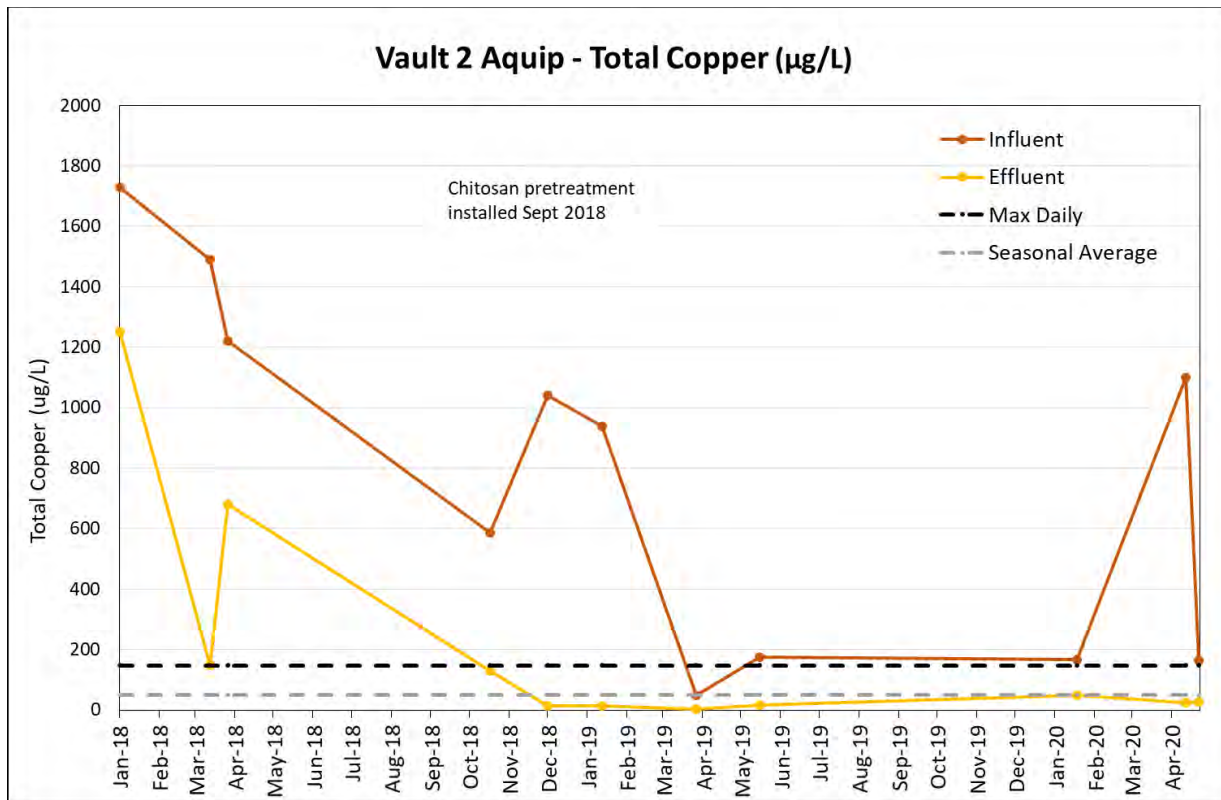
---

# **Stormwater Treatment Performance Graphs Port of Port Townsend Boatyard**

**Appendix B – Stormwater Treatment Performance Graphs**  
**Media Filters and Addition of Chitosan Lactate Coagulation Pretreatment**  
**Port of Port Townsend Boatyard**





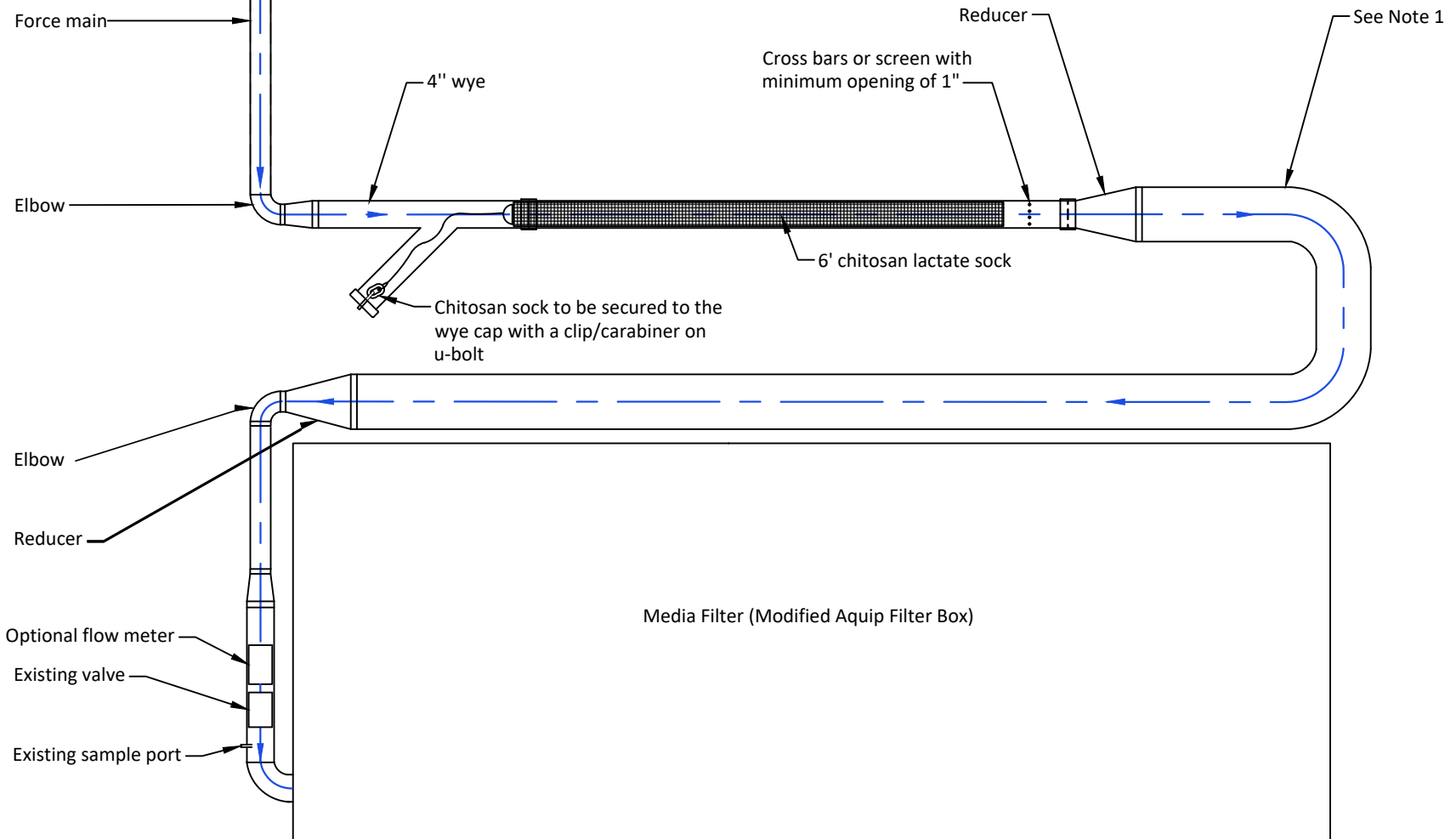


APPENDIX C

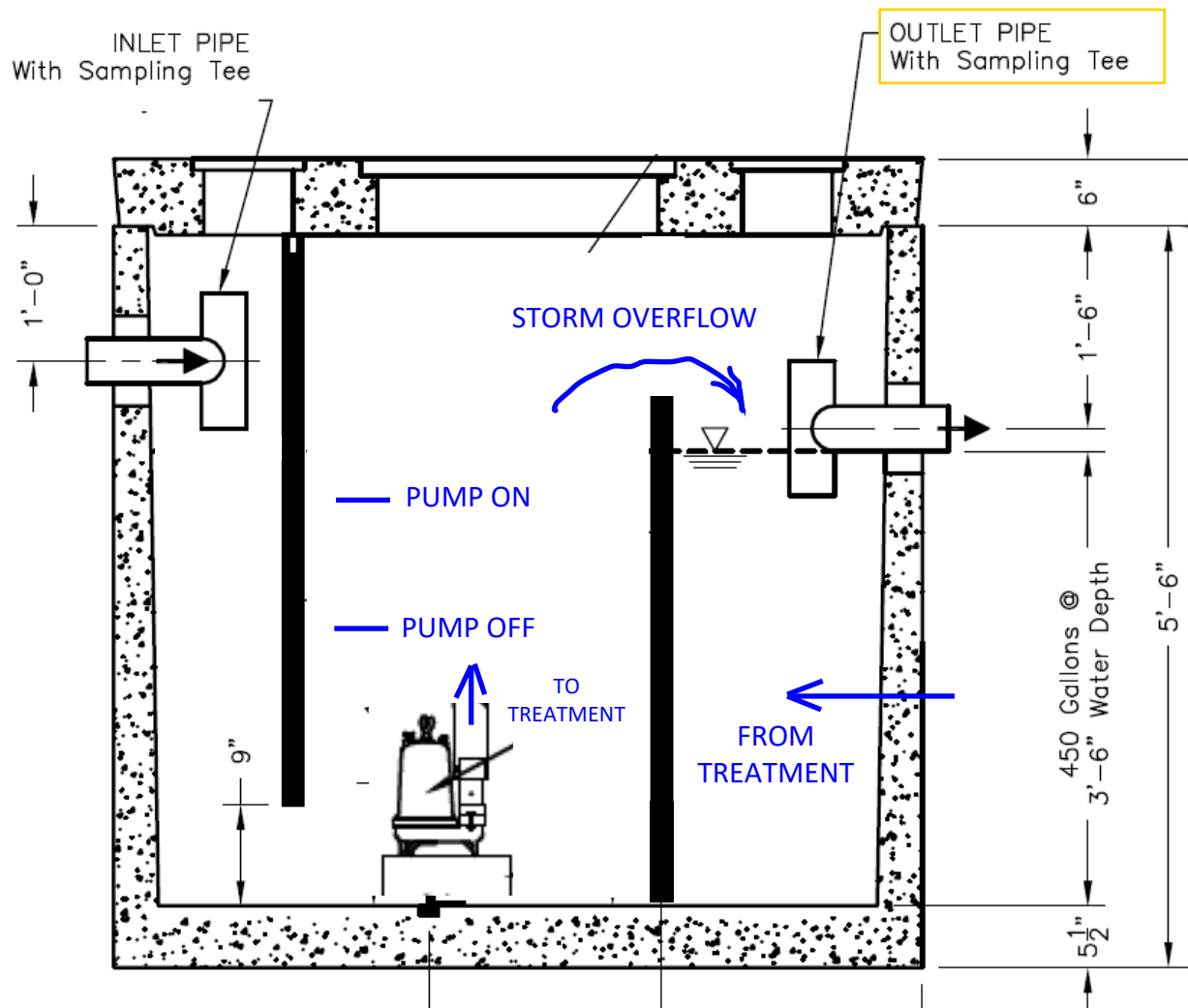
---

## **Chitosan Sock Installation Schematic**

Landau Associates | P:\Projects\2177\001\

**Note**

1. For 8" Ø pipe a total pipe run of 15 LF is required for 1 minute of contact time at design pumping rate of 39 gpm, or for 12" Ø pipe a total pipe run of 7 LF is required for 1 minute of contact time. Support full length of new pipe as needed by attaching to side of steel filter box or providing other appropriate support. Protect from traffic impact.
2. Not to scale.



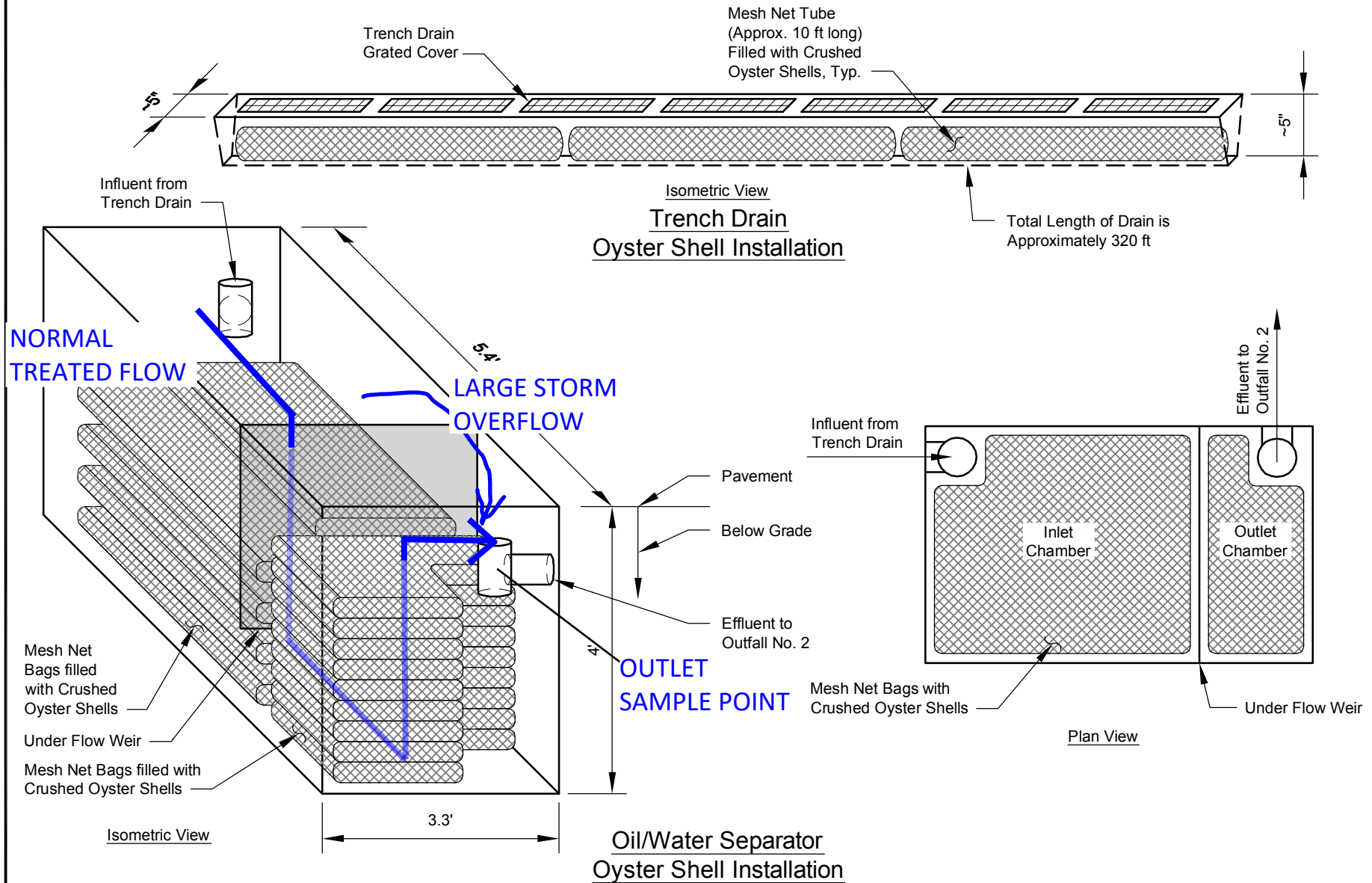


APPENDIX D

---

## **Schematic Diagram – Oyster Shell Filter Vault**

LANDAU ASSOCIATES, INC. | V:\173\028\050.051\Figure 4.dwg (A) "Figure 4" 8/16/2011



**TABLE D-1**  
**PERFORMANCE OF OYSTER SHELL FOR COPPER AND ZINC REMOVAL**  
**BOATYARD FACILITY USING RETROFITTED VAULT**  
**SNOHOMISH COUNTY, WASHINGTON**

				Copper (µg/L)	Zinc (µg/L)	
Daily Maximum Benchmark				147	90	
Date	Total Copper (µg/L)		Percent Removal	Total Zinc (µg/L)		Percent Removal
	OWS Inlet	OWS Outlet		OWS Inlet	OWS Outlet	
Oct-16	940	60	94%	790	23	97%
Mar-17	200	52	74%	180	20	89%
Apr-18	480	140	71%	460	54	88%
Oct-18	910	140	85%	520	74	86%
Jan-19	360	87	76%	280	110	61%
May-19	310	74	76%	360	<40	89%
Oct-19	1,300	120	91%	330	250	24%
Nov-19	540	80	85%	170	42	75%
Jan-20	120	110	8%	220	110	50%
Apr-20	440	110	75%	210	81	61%
May-20	370	130	65%	160	31	81%
Oct-20	320	160	50%	290	73	75%
Nov-20	470	210	55%	280	180	36%
Jan-21	470	63	87%	330	31	91%
Apr-21	1,900	180	91%	680	40	94%
May-21	5,500	50	99%	1,300	14	99%
	Median percent removal		76%	Median percent removal		83%
	Average percent removal		74%	Average percent removal		75%

## Notes:

OWS = Oil/water separator

1. Concentrations are in micrograms per liter (µg/L)
2. OWS vault was retrofitted to hold oyster shell flake
3. Design provides 4 minute empty bed contact time for stormwater with the oyster shell at the treatment design flow rate

180 Value in red indicates a value above the benchmark value.

**TABLE D-2**  
**OYSTER SHELL STORMWATER TREATMENT VAULT SIZING**  
**NORTH HARBOR DIESEL - ANACORTES, WASHINGTON**

Objective: Use a known boatyard oyster shell treatment case study to determine if the existing trench drain is adequately sized to provide effective treatment for its drainage area.

**Example: Snohomish County Boatyard**

Design Flow Rate		Oyster Shell Media Bed Dimensions				Empty Bed Contact Time <b>4.2 min</b>
min		Length	Width	Height		
78.5 gal	x	4.4 ft	3.3 ft	3 ft	=	

$$\frac{78.5 \text{ gal}}{\text{min}} \times \frac{7.481 \text{ gal}}{\text{ft}^3} \times 4.4 \text{ ft} \times 3.3 \text{ ft} \times 3 \text{ ft} =$$

Oyster Shell Volume = 43.6 ft<sup>3</sup> = 1.6 yd<sup>3</sup>

Vault Model (exterior dimensions) = OW 660-SA (6' L x 4' W x 6' H)

**Planned for North Harbor Diesel Boatyard**

Design Flow Rate		Oyster Shell Media Bed Dimensions				Empty Bed Contact Time <b>28.2 min</b>
min		Length	Width	Height		
5.3 gal	x	4 ft	2.5 ft	2 ft	=	

$$\frac{5.3 \text{ gal}}{\text{min}} \times \frac{7.481 \text{ gal}}{\text{ft}^3} \times 4 \text{ ft} \times 2.5 \text{ ft} \times 2 \text{ ft} =$$

Oyster Shell Volume = 20 ft<sup>3</sup> = 0.7 yd<sup>3</sup>

Note: Use oyster shell flake, rather than whole or broken shell, for increased reactive surface area

# Exhibit 2



**201 4TH STREET, SUITE 102  
OAKLAND, CALIFORNIA 94607  
TELEPHONE 510.658.0702**

September 25, 2024

Bryn Bowen  
United States Department of Justice  
Environment & Natural Resources Division  
Law and Policy Section  
P.O. Box 7415  
Washington, D.C. 20044-7415

Re: Waste Action Project v. North Harbor Diesel and Yacht Service, Inc. (Case No. 2:24-cv-00172-JNW)

Dear Ms. Bowen,

This letter is intended to provide assurance that I have received the proposed Consent Decree the above parties, and that I am authorized by my Board of Directors to make the following binding commitments on behalf of the Rose Foundation.

- 1) I understand that the Rose Foundation should receive funds from Defendant as specified in the Consent Decree.
- 2) The Rose Foundation shall only use these Defendant funds for projects that benefit water quality in the north Puget Sound and Padilla Bay watersheds.
- 3) After funds are disbursed, the Rose Foundation shall send a report to the Justice Department, the Court and the Parties setting forth the recipient and purpose of the funds and demonstrating conformance with the nexus of the Consent Decree.

**Rose Foundation for Communities and the Environment**

The Rose Foundation is a 501(c)(3) public charity (tax ID#94-3179772). Its mission is to support grassroots initiatives to inspire community action to protect the environment, consumers, and public health. To fulfill this mission, the Rose Foundation conducts the following activities:

- Raise money to award as grants to qualified non-profit organizations conducting charitable operations. The Foundation does not support political lobbying activities prohibited by Section 501(c)(3) of the IRS Code, and no portion of the Defendant's funds shall be used to support any political lobbying activities.
- Work directly in schools and in the community to encourage environmental stewardship and civic participation.
- Help government efforts to control pollution and protect the environment by encouraging community engagement in local, state and federal research and policy development.



Within this broad range of activities, all of the Rose Foundation's work revolves around one or more of the following strategic themes:

- Build and maintain a bridge between the community and organized philanthropy.
- Protect the natural environment, public health, and community and consumer rights.
- Promote collaboration between labor, environmental, business, consumer, and social interests.
- Cultivate a new generation of environmental stewards and social policy leaders.
- Respect the inalienable rights protected by our nation's constitution, and the essential human rights to clean air, clean water, and individual dignity and privacy.

The Rose Foundation is governed by a Board of Directors. Grant applicants are required to submit written proposals, which must include at a minimum specific information about the goals, activities and projected outcomes of the proposed project, background about the charitable applicant, budget information, and a specific funding request. The Foundation may require additional information in order to fully evaluate the application. Applications are first screened by Foundation staff. Staff then makes recommendations to the Foundation Board for action. The Foundation requires all projects to submit written reports within one year of receipt of the grant award describing work conducted under the grant, thereby providing an accountability mechanism over funds awarded. Annual audits by a certified public accounting firm are posted on the Foundation's website [www.rosefdn.org](http://www.rosefdn.org).

I hope this provides you with the information you require. Please do not hesitate to contact me with any questions, or for additional information at (510) 658-0702 or [jisaacs@rosefdn.org](mailto:jisaacs@rosefdn.org).

Sincerely,



Jodene Isaacs,  
Director of Grantmaking

**SMITH & LOWNEY**  
\_\_\_\_ PLLC \_\_\_\_  
**ATTORNEYS AT LAW**

September 30, 2024

Docket Clerk for the Honorable Jamal N. Whitehead

**Re. Waste Action Project v. North Harbor Diesel and Yacht Service, Inc.; No. 2:24-cv-00172-JNW; Waiting period before entry of consent decree**

Dear Docket Clerk:

This is submitted with the proposed Consent Decree and Joint Motion for Entry of Consent Decree for the above-captioned case. Please note that, pursuant to the explicit direction of the Clean Water Act, the Consent Decree should not be entered by the Court until a 45-day Department of Justice and EPA review period has expired. Thus, the hearing is noted accordingly. Please do not have this Consent Decree entered before that time. Please call if you have any questions about this. Thank you.

Sincerely,

SMITH & LOWNEY, PLLC

/s/Katelyn Kinn

Katelyn Kinn, WSBA #42686  
Attorney for Plaintiffs

